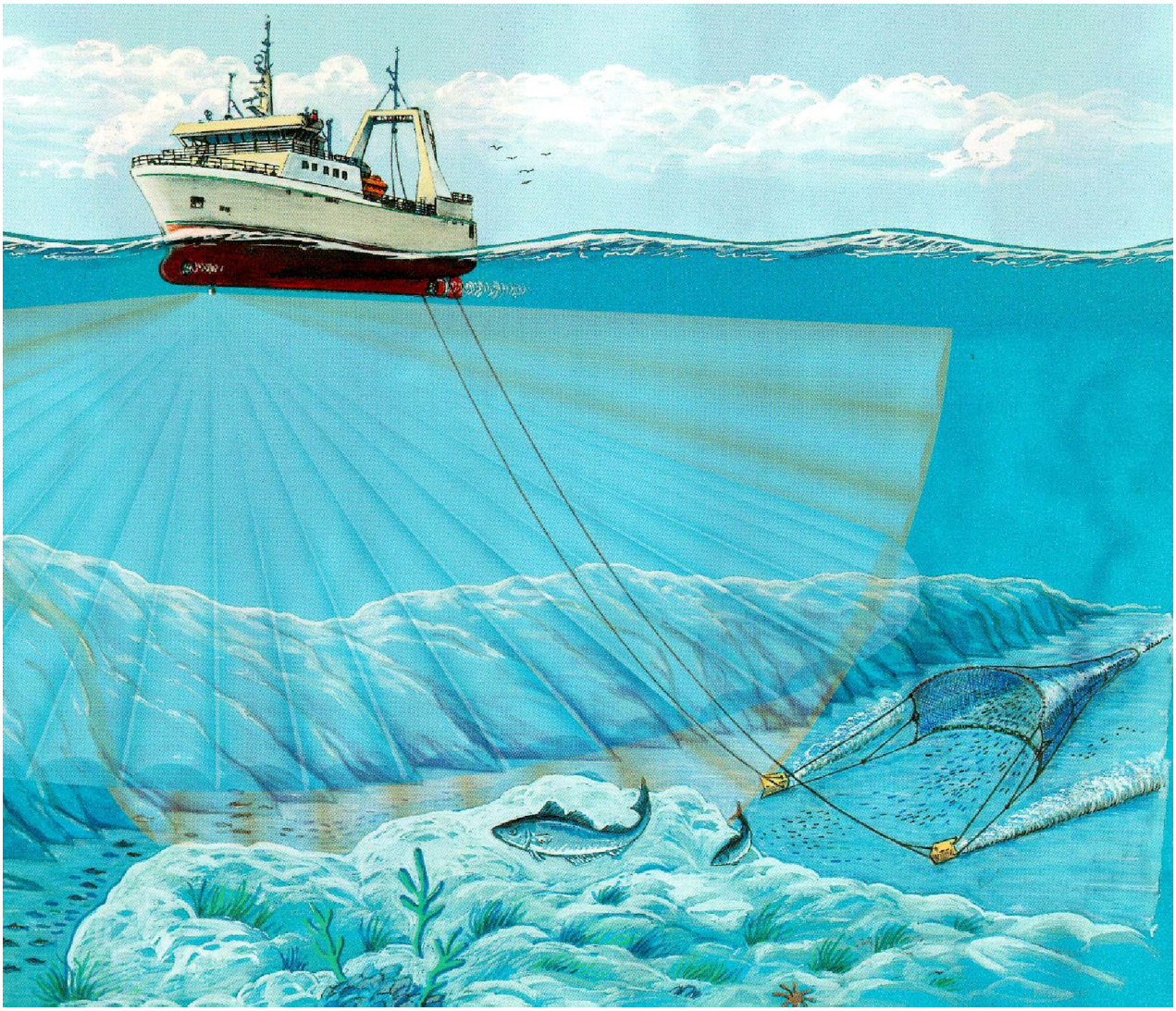
Operator manual

Simrad SD570
Fishery sonar



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SIMRAD
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Simrad SD570

Fishery sonar

Operator manual

850-160368 / Rev.B

Note

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Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment or injury to personnel. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

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ISBN 82-8066-017-8

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Sections

1 System familiarization

This section contains a description of the SD570 sonar.

2 Modes of operation

This section describes the different modes of operation.

3 Operation

This section contains descriptions of all control knobs and menu systems of the SD570 sonar, as well as start and stop procedures.

4 Maintenance

This section deals with maintenance work that may be carried out by the user.

Remarks

References

Further information about the SD570 system may be found in the following manuals:

- SD570 Installation manual

The reader

This operator manual is intended to be used by the system operator. He/she should be experienced in the operation of positioning systems, or should have attended a Simrad training course.

Note

This manual includes sections that may be revised individually. In the event of a revision to any part of this manual, this “Cover and Contents” section will be replaced.

Document logistics

Rev	Date	Written	Checked	Approved
A	Unknown			
B	02.02.04	RBr	EGJ	ESB

Sect	Title	File	P.no/Rev
0	Cover and contents	850-130368	B
1	System familiarization	850-160137	A
2	Modes of operation	850-160138	A
3	Operation	850-160139	A
4	Maintenance	850-160140	A

Rev. A First edition

Rev. B Re-issued with ISBN number. Only this cover and contents document changed.

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850-160137 / AA000 / 3-14

SD570
System familiarization

This section contains a description of the SD 570 sonar.

Document revisions

Rev	Date	Written by	Checked by	Approved by
A	13.01.97	CL	SØJ	SØJ
B				
C				
D				

(The original signatures are recorded in the company's logistic database)

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Document history

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Rev. A Original issue.

1 INTRODUCTION

The Simrad SD 570 sonar is a medium range omnidirectional sonar, designed for small, medium and large sized fishing vessels, both purse seiners and trawlers. Great emphasis has been placed on giving the best possible presentation on the 14" high–resolution colour display. The result is 9 different display modes, which gives a flexible choice for a large range of user applications.

The transceiver system contains an advanced multifrequency filter system (FM). This, in addition to giving a clear and noiseless echo presentation, also gives the system a far greater range than traditional single–frequency sonars.

The multi–element transducer allows the sonar beam to be trained and tilted electronically in any direction. This gives unlimited possibilities for automatic tracking of a school of fish and for displaying the whole water volume around the vessel.

The retractable transducer unit is designed to be used at a maximum speed of 15 knots.

WARNING !

Whenever docking the vessel, the switch S101 at the rear of the Sonar Control Unit should be switched to OFF position to prevent inadvertent use of the sonar. For location of the switch, see figure 1 in section "Maintenance". The transducer might be damaged if transmitting in air.

2 SD 570 UNITS

2.1 Introduction

Figure 1 shows a system diagram for the SD 570 sonar, and as can be seen, it consists of only three main units:

- Sonar Control Unit
- Transceiver Unit
- Hull Unit

A short description of each unit will be given in the following chapters.

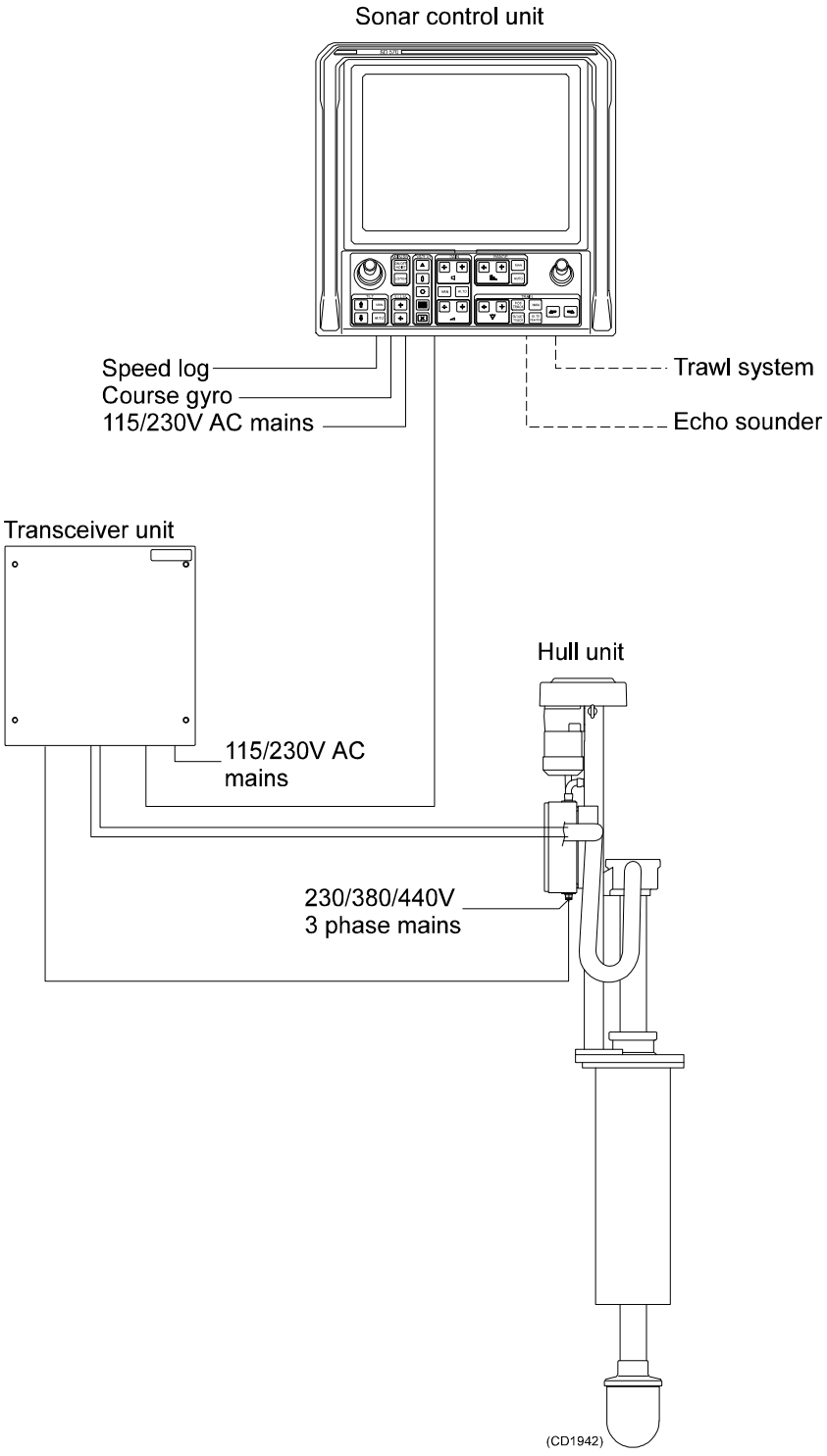

Figure 1 - SD 570 Sonar system diagram

2.2 Sonar Control Unit

The Sonar Control Unit comprises a 14” display unit, a control panel, a loudspeaker and a computerized electronic unit, all housed in one console. The complete operation of the sonar system is performed from this unit.

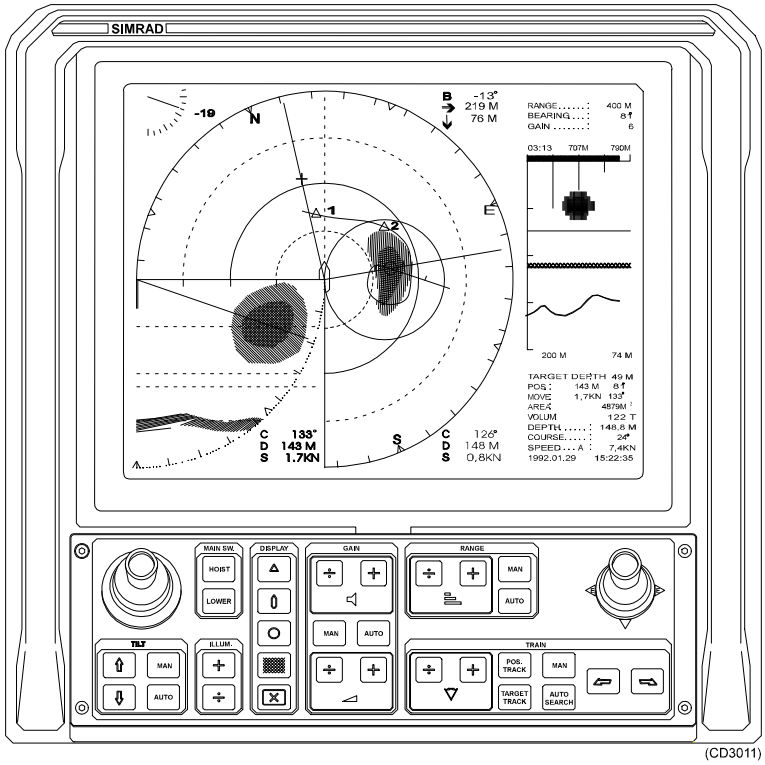

Figure 2 - SD 570 Sonar Control Unit

The display is a 14” raster–scan high–resolution colour CRT, creating a stable and flicker–free picture. In addition to the sonar picture, the CRT also displays the user menu for the interactive operation. In order to ease the situation comprehension, certain specific colours have been chosen to better the distinction between the various elements in the scene.

The control panel contains all necessary control functions for operating the sonar. The controls are arranged in function groups, which gives a clear and easy operation. In addition to the background light, the push buttons have a signal light for easy indication of the operation mode.

The computerized electronic unit is located in the bottom section of the console, and performs the following functions:

- Interfacing of the control panel
- Interfacing external connections (log, gyro, etc.)
- Generating the total display presentation
- Generating the audio of the echo signal
- Controlling the serial line communication to the transceiver

The **loudspeaker**, which is mounted inside the electronic unit, reproduces the audio of the echoes for the selected audio channel.

2.3 Transceiver Unit

The Transceiver Unit is located in the sonar room, close to the Hull Unit. The unit contains the following modules, seen from the left–hand side in figure 3:

- Eight equal transceiver boards (TRB–32)
- Signal processor board (SPB–31)
- Transceiver Interface Board (TIB)
- Power supply
- High voltage unit

The Transceiver Unit performs most of the main functions of the SD 570 sonar:

- Receives the operator settings from the Sonar Control Unit.
- Generates the high voltage for the 256 transmitters
- Controls the transmission with a total of 256 separate 57 kHz transmitters
- Controls the total gain and data acquisition of the 256 separate preamplifiers
- Performs the digital beamforming of the received signals
- Executes the FM (Frequency modulation)
- Accomplishes the postprocessing (detection, AGC/RCG and ping–to–ping correlation)
- Transmits the received echo data to the Sonar Control Unit

The 256 transducer elements on the Hull Unit are connected directly to the front of the eight transceiver boards in the Transceiver Unit.

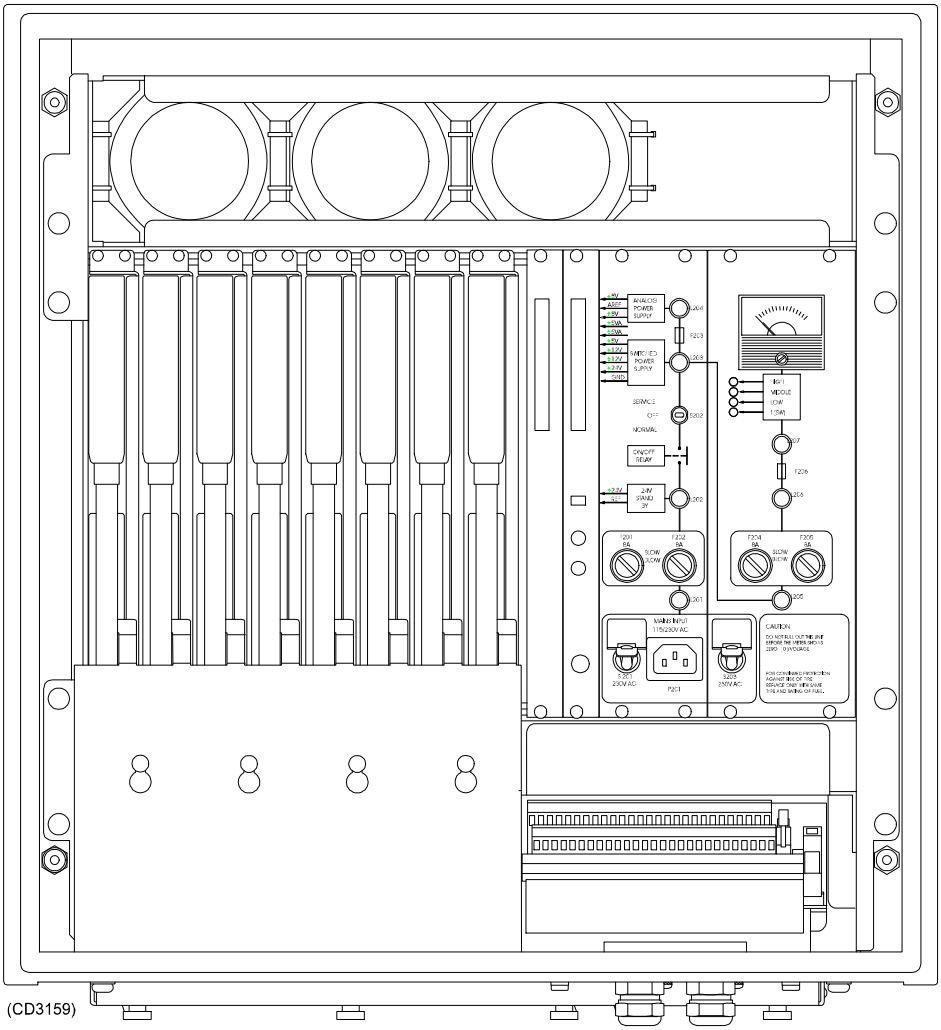

Figure 3 - The SD 570 Transceiver Unit

2.4 Hull Unit

The SD 570 Hull Unit is designed to be lowered 1.0 meter below the ship's hull at a maximum ship's speed of 15 knots. The transducer can also be lowered to a middle position where only the transducer face is outside the sonar trunk.

In addition to the solid construction of the hoisting/lowering mechanism, the SD 570 Hull Unit comprises the following main components:

- Raising/lowering motor
- Motor control unit
- Multi–element transducer

The motor on the Hull Unit is a three–phase motor, and it uses less than 25 seconds for raising and lowering the transducer. Note, that in case of voltage failure, the Hull Unit can be manually raised or lowered by a hand crank.

The motor control unit which is mounted on the Hull Unit, contains the control electronics for the raising/lowering motor.

The optional sensor for the electronic stabilization of the sonar beams is also housed in the motor control unit.

The transducer has a diameter of 20 cm, and contains 256 separate transducer elements. This provides unlimited electronic control of the sonar beams in any direction around and below the vessel.

WARNING !

If the transducer hits larger objects or bottom, the transducer shaft may be bent, or in worst case it can be broken off. A broken transducer shaft will cause water leakage in the top of the shaft. To prevent larger leakages in such a case, do not raise the transducer shaft to the upper position. To prevent serious damages it is therefore of great importance to have a good pump and warning system in the sonar room.

2.5 Auxiliary equipment

The SD 570 sonar requires connection to a speed log and a course gyro. An inaccurate log or gyro input will cause inaccurate indication of the vessel and target movements.

In addition to log and gyro, the following auxiliary equipment can be connected to the sonar:

- Simrad echo sounder, types EQ 50, EQ 55, EQ 100, ES 380/700 or ES 500.
  Gives depth readout in the menu and a bottom plot on the catch data page.
- Simrad Trawl Instrumentation: FS 900, FS 3300 or ITI.
  FS 900 and FS 3300: The trawl will be displayed in correct depth.
  ITI: The trawl will be displayed in correct depth, distance and bearing.

For connection of any of these auxiliary equipments, contact your local dealer.

3 FUNCTIONAL DESCRIPTION

3.1 Introduction

The basic principles of the SD 570 sonar are unique because of the 256 separate transmitter and receiver channels with their transducer elements spread around on the transducer array. The transmission, reception and data processing are under computer control, and the powerful capabilities of the sonar are results of sophisticated digital signal processing software and state of the art hardware.

3.2 Functional principles

When the omni beam is tilted, the total beam picture can be compared with folding an umbrella, which means that all beams in 360° around the vessel have the same tilt angle.

The beam can be tilted from +10° up to –90° down, where –90° is formed by one single beam straight down like an echo sounder.

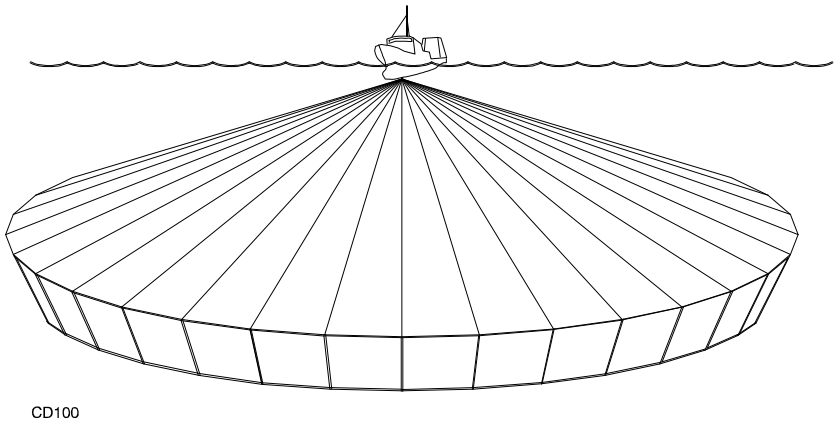

Figure 4 - The OMNI beam

Note that the presentation can be selected in the menu to be HORIZONTAL with true distance to the target, or SLANT where the displayed distance is measured along the tilted beam.

In addition to seeing the target from above, it is also possible to see the target from the side, by using the vertical slice presentation. In this case the beam covers a continuous vertical beam from 0° to –90° in one transmission. By adding two such slices, a complete 180° vertical slice can be presented.

This vertical slice, which is presented by the white audio line in the horizontal picture, can be selected to any bearing by the manual training control.

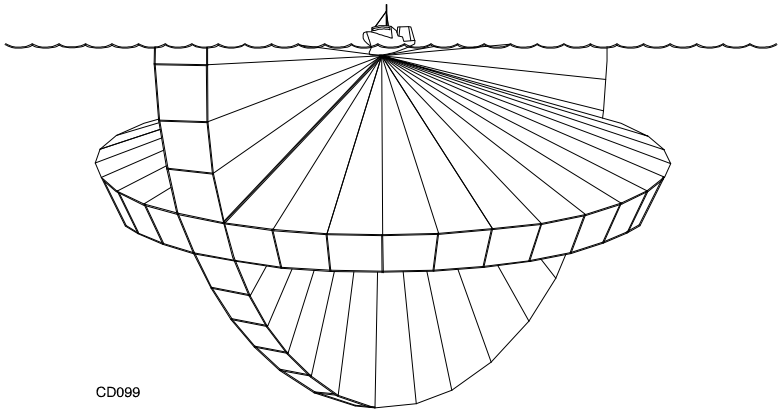

Figure 5 - OMNI/Vertical combination

The combination of the OMNI mode and the vertical slice, will give an optimal visualizing of the catch situation. In addition to the OMNI picture, the vertical slice is especially useful for visualizing the vertical distribution of a school of fish. In that way, it is not necessary to go over the target to see the distribution on the echo sounder, which often results in a spreading of the school.

When the optional stabilization system is installed in the sonar, the transducer will be stabilized electronically for roll and pitch up to approximately ±30°. The stabilization may be switched ON and OFF in the menu.

The OMNI/vertical combination is used in several display modes to give the best situation overview for both purse seiners and trawlers. In these presentations the seine net and the trawl can be seen in relation to the vessel, the school of fish and the bottom.

3.3 FM (Frequency Modulation)

In addition to the traditional single frequency transmitting method, the SD 570 sonar is equipped with an FM correlation mode.

In FM mode each transmission pulse contains up to 8 different frequencies, and the receiver makes a spectrum analysis and compares the received echoes with the transmitted frequency code. This provides a filtering effect, which efficiently reduces interference, noise and reverberation. In addition to giving a clean and stable echo presentation, this also increases the sonar's detection range

3.4 Receiving

A great effort has been made to reduce unwanted noise to get a clean and stable echo presentation. To achieve this goal the sonar receiver has the following filtering possibilities:

BANDPASS FILTER
One hardware filter for each preamplifier with a bandwidth of 1500 Hz to reduce interference and noise from signals outside the sonar frequency.

FM CORRELATION FILTER
See description in paragraph 3.3.

AGC (Automatic Gain Control)
This control will automatically adjust the gain in the preamplifier, dependent on the strength of the incoming echo signals. The strength of the filtering can be selected in the menu: OFF, WEAK, MEDIUM and STRONG. Note that the AGC is sensing the echo strength in the audio channel, and use this as a basis for adjusting all the receiver beams.

RCG (Reverberation Controlled Gain)
RCG is sensing the noise level (reverberation, propeller noise, etc.), adjusting the gain individually for each of the 64 receiver beams to eliminate the noise on the display. The strength of the filtering can be selected in the menu: OFF, WEAK, MEDIUM and STRONG.

Note that scattered fish can be perceived as reverberation, so therefore RCG should be used with care if scattered schools are to be detected.

PP FILTER
The sonar is equipped with a ping–to–ping filter which gives a clean and steady presentation by reducing the interference and noise. This filter compares the echoes from a selected amount of transmissions (pings), and an echo has to be present in the selected amount of pings in order to be presented on the display. The selection is made in the menu, with the following possibilities:

OFF	- filter switched off
WEAK	- compares 2 pings
MEDIUM	- compares 4 pings
STRONG	- compares 8 pings

Note that in rough seas, when the beam easily can miss the target in several pings, the PP filter should be used with care.

TVG (Time Variable Gain)
The TVG function controls the gain of the receiver so that a school with a given size and density is presented with approximately the same strength on the display, inside the regulated TVG range. This can also be seen as a filter, because it reduces the noise close to the vessel.

The regulated strength of the TVG can be selected in the menu.

4 TECHNICAL SPECIFICATIONS

Frequency:	57 kHz
Range:	Maximum: 4000 meters Minimum: 125 meters
Source level (SL):	Sound pressure measured 1 meter from the transducer: OMNI: 214 dB/1µPa Single beam: 220 dB/1µPa
Detection range:	1700 m against a 0 dB target under ideal conditions
Transmitter:	Output power: 3500 W 256 transmitters with electronic beamforming 241 transmitters with electronic beamforming CW or FM transmission
Receiver:	256 receiver channels with electronic beamforming FM pulse correlation filter TVG/AGC/RCG regulation Ping-to-ping filter
Transducer:	Combined half sphere/cylinder transducer with 256 elements Beam widths: Horizontal: 12°, 360° Vertical: 12°
Tilt:	Electronically from +10° to -90°
Display:	14″ colour monitor Echo presentation in 32 colours Resolution: 512 x 680 pixels

Modes of presentation:	Bow up
	North up
	True motion
	180° horizontal/audio channel
	180° horizontal/echo sounder
	180° horizontal/180° vertical
	270° horizontal/90° vertical
	OMNI/180° vertical
	OMNI/90° vertical/echo sounder
Track/search functions:	Automatic position track
	Automatic/manual target track
	Automatic/manual tilt search
	Automatic/manual audio search
Auxiliary equipment:	Speed log, course gyro, echo sounder, ITI and FS trawl systems.
Mains supply:	Display unit: 115/230 VAC 15%, 47-63 Hz
	Transceiver unit:115/230 VAC 15%, 47-63 Hz
	Hull unit: 230/380/440 VAC 15%, 47-63 Hz 3-phase
Power consumption:	1200 VA max.

850-160138 / AA000 / 3-14

SD570
Modes of operation

This section describes the different modes of operation of the SD 570 sonar.

Document revisions

Rev	Date	Written by	Checked by	Approved by
A	13.01.97	CL	SØJ	SØJ
B				
C				
D				

(The original signatures are recorded in the company's logistic database)

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Document history

(The information on this page is for internal use)

Rev. A Original issue.

1 INTRODUCTION

All operation of the sonar is made from the Sonar Control Unit. This section contains a detailed description of the different modes of operation. The man–machine interface, the normal start/stop procedure and the menu operation is described in section ”Operation”. In order to get the necessary understanding of the sonar working principle, read first through section ”System familiarization”.

Note that the SD 570 transducer in its lower position reaches 1.0 meter below the hull, and that the maximum speed in that position is 15 knots.

To ensure the best possible reliability of the sonar, it is important to follow the maintenance procedure described in section ”Maintenance”.

Caution ! ***Whenever docking the vessel, the switch S101 at the rear of the Sonar Control Unit should be switched to OFF position to prevent inadvertent use of the sonar. For location of the switch, see figure 1 in the section "Maintenance".***

Caution ! ***The transducer might be damaged if transmitting in air.***

Caution ! ***When docking, also refer to chapter 4.2 in the same section.***

2 MODES OF OPERATION

2.1 General

Great emphasis has been placed on giving the best possible overview presentation of the echo situation of the water volume around and under the vessel. The result is 9 different display modes, which gives a flexible choice for a large range of user applications.

The mode selection is made in the menu, and a detailed description of each mode will be given in the following chapters.

In addition to the symbols shown in the following mode figures, different ”cosmetics” can be added on the display. A description of the different symbols and cosmetics will be given throughout this chapter.

Note that the different mode figures shown in the following chapters are common for several types of sonars. Details like range, menu etc. may therefore not be correct.

2.2 Bow up

In this mode the ship symbol is stationary in the centre of the screen, with the bow pointing upwards. The echo presentation can cover 360 degrees around the ship, and if OMNI is selected, all echoes will be updated for each ping. The distance from the ship symbol to the echo ring is equal to the selected range.

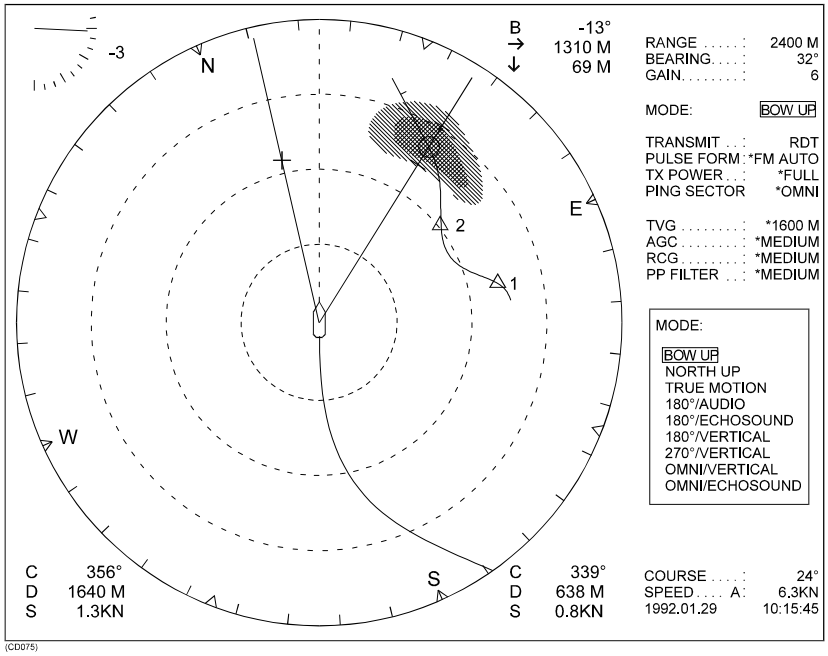

Figure 1 - Bow up

The movement of the echoes across the screen will be a combination of the ship's course and speed and the targets' own movement. Figure 1 shows the Bow Up mode with a school of fish in manual and automatic target tracking. The manual tracking data is shown in the lower right–hand side of the echo field, and the automatic tracking data is shown in the lower left–hand side. The menu field shows the submenu for the MODE selection.

2.3 North up

In this mode, true north is always up on the screen, and the ship symbol is stationary in the centre of the screen with the bow pointing in the direction of the ship's course.

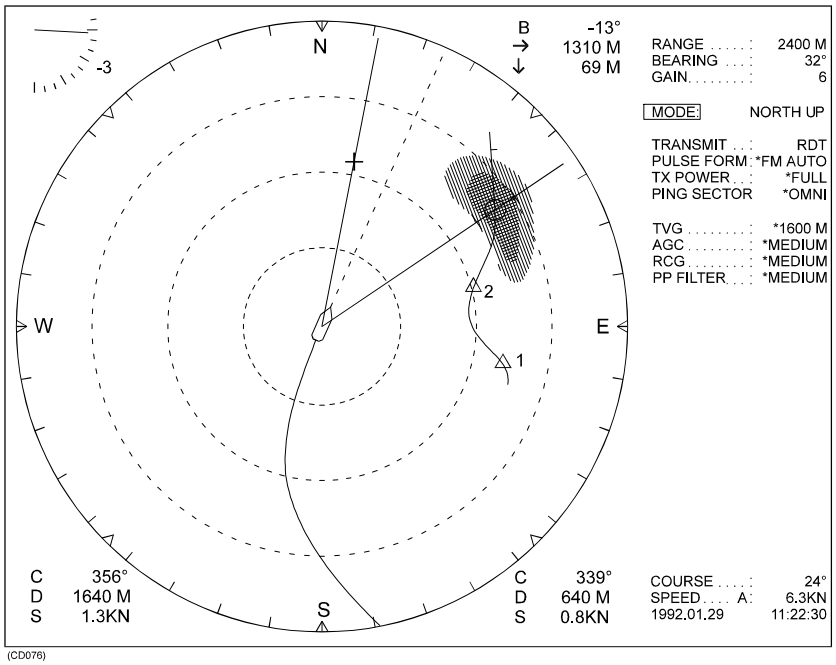

Figure 2 - North up

The echoes will also here move across the screen relative to the ship's course and speed, and, as indicated in the figure, a course line after the ship and target can be displayed.

The ship's course and speed, and the date and the time are shown in the bottom of the menu field.

The tilt indicator is displayed in the upper right–hand corner. The bearing, distance and depth of the moveable cursor cross are displayed in the upper left–hand side of the echo field.

2.4 True motion

In true motion the picture is locked to a geographical position, with true north up, as shown in figure 3.

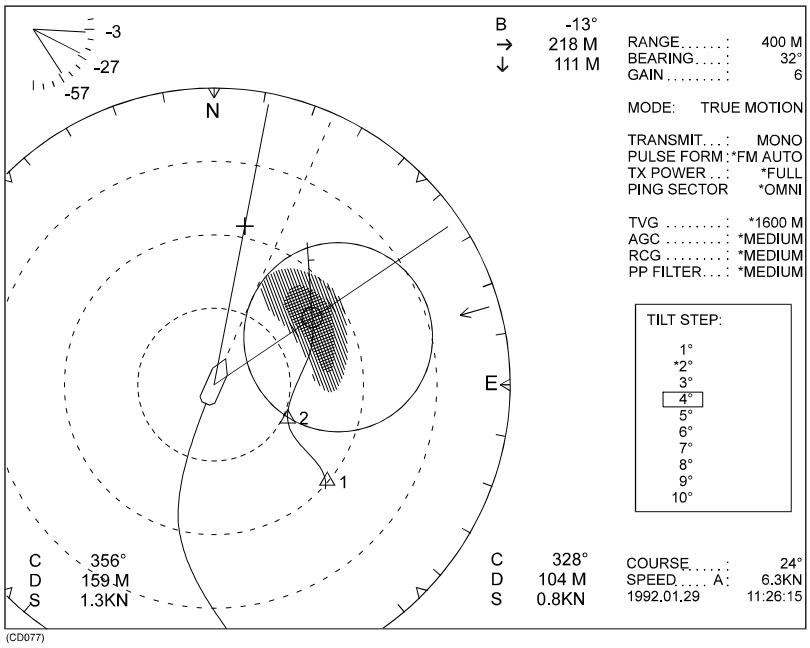

Figure 3 - True motion

The ship symbol moves around on the screen according to the course and speed readings. All echoes are always in correct position relative to the ship, and their movements on the screen will be a true representation of the movements of the targets through the water.

When the ship symbol reaches the screen edge, it will automatically be moved to the centre or to a position determined by the DISPLAY CENTRE button. This position is reset to the screen centre whenever the mode is changed.

When selecting TARGET TRACKING, the target will automatically be moved to the screen centre. In this mode the DISPLAY CENTRE button will bring the target back to the centre in case it has moved. The target will also be moved to the centre when changing range.

2.5 180°/Audio

In this mode the upper half of the screen shows a 180° bow up presentation, while the lower part is used for a recording of the audio channel.

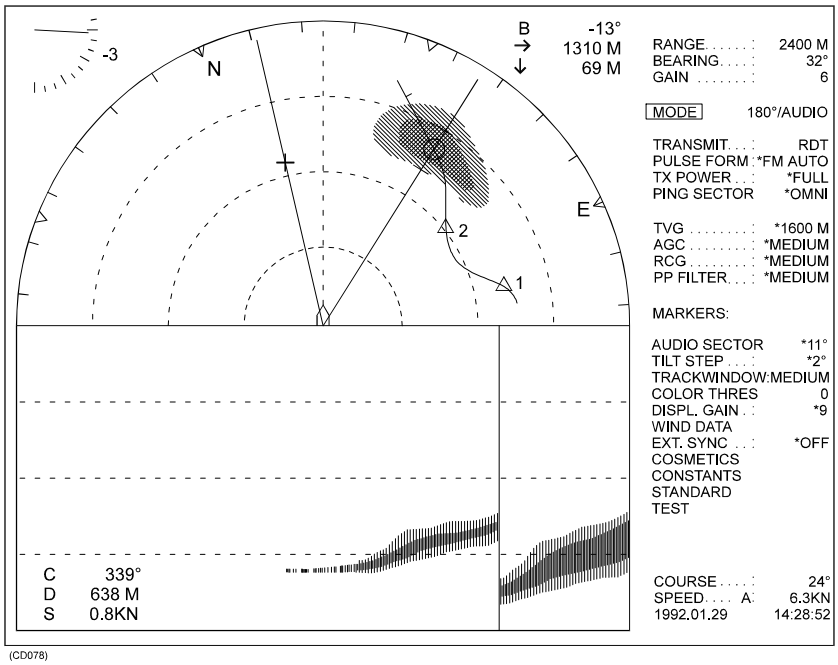

Figure 4 - 180°/Audio

The audio channel is shown with a continuous white line in the horizontal picture, and can be trained in any direction. The recorded echoes are a direct replica of the echoes under the white audio line.

As the audio channel is recorded over a period of time, this mode is especially useful for detection of weak echoes mixed with reverberation or noise.

The recording of the last 512 transmissions is always stored in the computer, even if another mode is selected. That means that this recording will always be presented when selecting the 180°/audio mode.

Note that the ping sector will remain 360° if OMNI is selected, but that only 180° are presented.

2.6 180°/Echo sounder

In this mode the upper half of the screen shows a 180° bow up presentation, while the lower part is used for an echo sounder recording. That means that the sonar acts alternately as a normal sonar and an echo sounder for each second transmission.

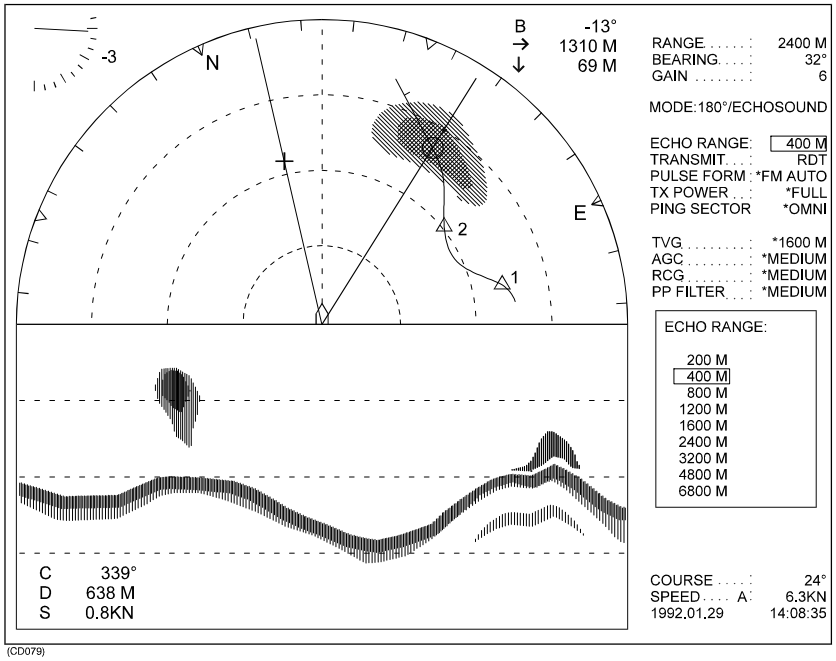

Figure 5 - 180°/Echo sounder

When selecting this mode, the lower half of the screen will be dark. A recording will then be built up from right to left on the screen, and store the last 512 transmissions.

Most of the vertical settings as range, gain etc. may be selected separately in the VERTICAL menu (refer to chapter 5.25 in section Operation).

2.7 180°/Vertical

In this mode the upper half of the screen shows a 180° bow up presentation, while the lower part is used for a vertical slice presentation. In that way an echo can simultaneously be presented in both horizontal and vertical dimensions.

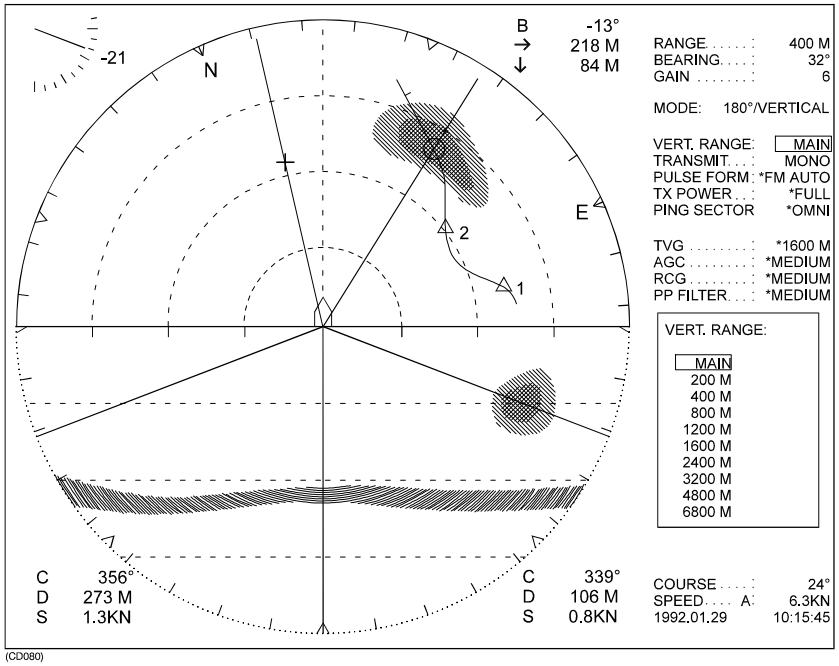

Figure 6 - 180°/Vertical

The bearing of the vertical slice is indicated in the horizontal plane by the white audio line, and can be trained to any bearing by the manual training knob.

The white audio line indicates the fore part of the 180° vertical slice, and is always preset to the right in the vertical presentation, while the rear part is to the left.

Most of the vertical settings as range, gain etc. may be selected separately in the VERTICAL menu (refer to chapter 5.25 in section Operation).

If the vertical range is selected to be shorter than the sonar range, the vertical range can be presented in the horizontal sonar picture with a white circle, selected in the COSMETICS menu.

In addition to the normal tilt indicator, the tilt angle is also shown in the vertical slice by a continuous white line. In that way, it is easy to select the optimal tilt angle on an echo in the vertical slice, to get the best drawing of the echo in the horizontal presentation.

2.8 270°/Vertical

This mode is specially made for purse seining, where the vertical half slice is displayed in the lower left corner for normal setting of the net on starboard side. If the net is selected to be set on the port side, the vertical half slice will be displayed in the lower right–hand corner.

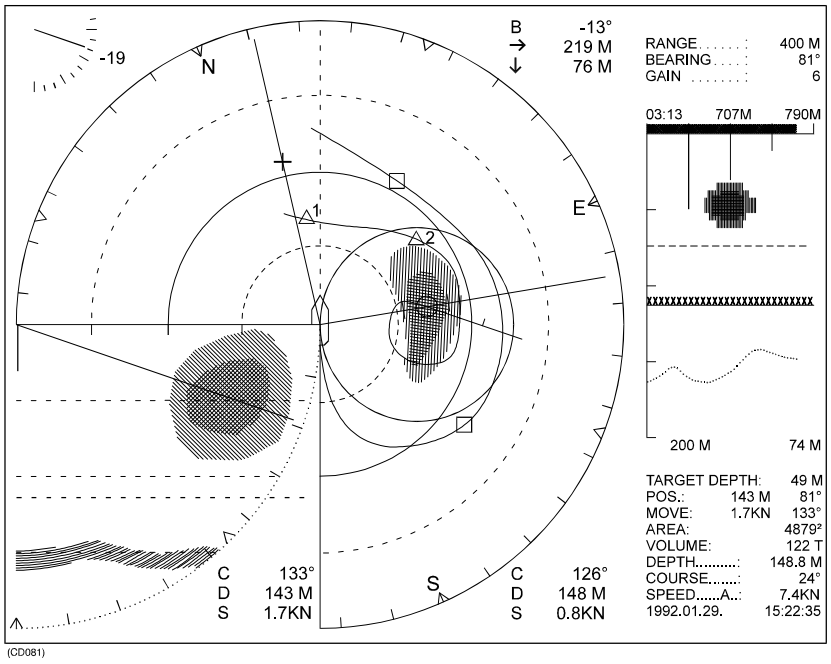

Figure 7 - 270°/Vertical

With this presentation mode, it will be easy to keep the best contact with a school in both the vertical and horizontal presentation, and to determine the size distribution of the school. The position of the school relative to the bottom is another important information in the presentation.

Figure 7 shows a typical example of a seine catch situation. The horizontal presentation shows the seine circle and the course line of the target and the ship. The upper square marker indicates the position where the net was shot, and the lower square marker indicates the half net position.

The slice shows a detailed presentation of the school and the bottom. The lower dotted line indicates the total net depth, and the vertical line to the left indicates the sinking depth of the net.

The catch data page for purse seining is selected in the menu field. In addition to showing all the net data relative to the target and the bottom, this page also shows all available target data. A detailed description of this catch data page is given in chapter 5.26 in section Operation.

2.9 Omni/Vertical

This mode is specially made for trawling, where a complete overview of the horizontal and vertical situation is presented.

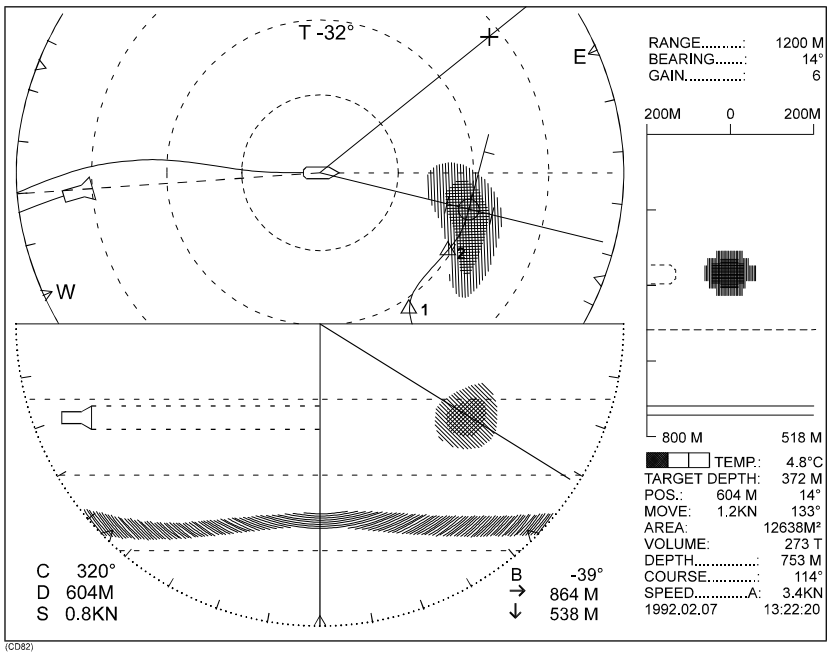

Figure 8 - Omni/Vertical

The bearing of the vertical slice on the right–hand side is as in 180°/Vertical mode indicated by the white audio line, while the slice on the left–hand side in this mode is indicated by a long–dashed line. This left–hand slice can be selected with the gear button to be an 180° extension of the audio line, or to be locked to the trawl symbol.

The trawl symbol can be added into the echo presentation in three different ways:

- Manually from the menu.
- Automatically in correct depth when connected to Simrad FS900 or FS 3300 trawl sonars.
- Automatically in correct depth, distance and bearing when connected to Simrad ITI Trawl Instrumentation.

Figure 8 shows a typical example of a pelagic trawling situation. The right–hand vertical slice is here locked to the school of fish, while the left–hand slice is locked to the trawl symbol. The vertical opening of the trawl is indicated by two dotted lines in the vertical presentation.

The normal tilt indicator is here replaced by the digital readout in the centre on the top of the display, this to give more space for the echo presentation.

The catch data page for trawling is selected in the menu field. Here the trawl position is presented in relation to the target, and this can be used as a sight in order to optimize the catch. In addition to showing the trawl position this page also shows all available target data.

A detailed description of this catch data page is given in chapter 5.27 in section Operation.

2.10 Omni/Echo sounder

This mode is also specially made for trawling, but in this mode the trawl–locked vertical slice is replaced by an echo sounder recording. This to ensure a more correct depth indication in case the sonar beam is bent because of temperature layers.

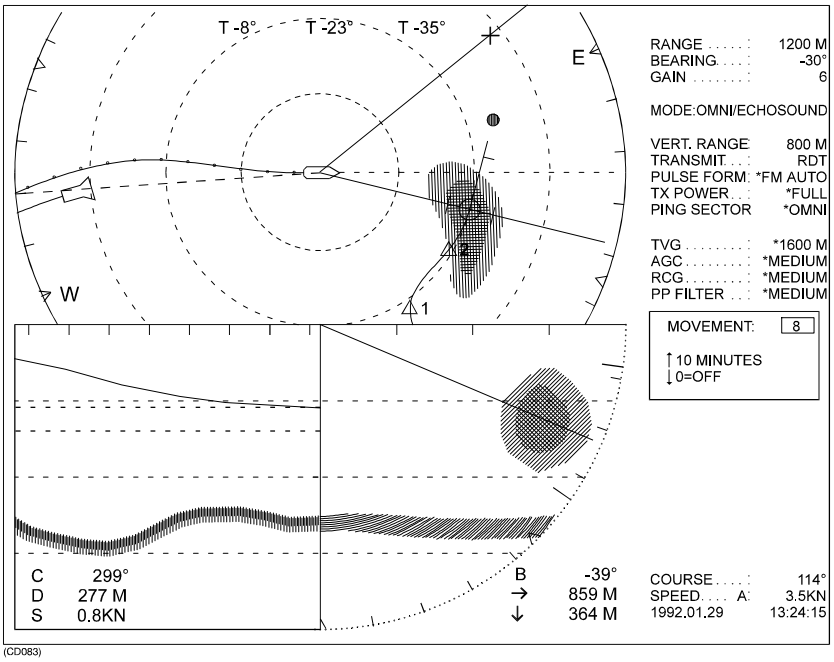

Figure 9 - Omni/Echo sounder

In order to get the school presented in the echo sounder recording, the vessel must here pass over the target.

Figure 9 also shows a typical pelagic trawling situation where automatic tilting is selected. The dot in front of the school shows the position of the school after 8 minutes, selected in the MOVEMENT submenu.

The falling line in the echo sounder recording shows the sinking of the trawl.

850-160139 / AA000 / 3-14

SD570 Operation

This section contains description of all control knobs and menu commands of the SD 570 sonar, as well as start and stop procedures.

Document revisions

Rev	Date	Written by	Checked by	Approved by
A	13.01.97	CL	SØJ	SØJ
B				
C				
D				

(The original signatures are recorded in the company's logistic database)

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Document history

(The information on this page is for internal use)

Rev. A Original issue.

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1 MAN-MACHINE INTERFACE

1.1 General

The operating controls are located on an easily-operated control panel. As some of the functions on a sonar system are in more intensive use than others, these have their own control knobs arranged in function groups, as tilt, train, etc. The other functions are "menu-oriented", controlled by a single joystick.

The menu is displayed on the right-hand side of the display. In order to make the best possible use of the sonar, the user must be familiar with all the operating controls and functions. It is not possible to identify settings that will provide the best results at all times. This is because the sonar conditions will vary from place to place as well as from time to time, and the variations may sometimes be severe. Study the sections Modes of Operation and Operation carefully, preferably while practising on the sonar at the same time.

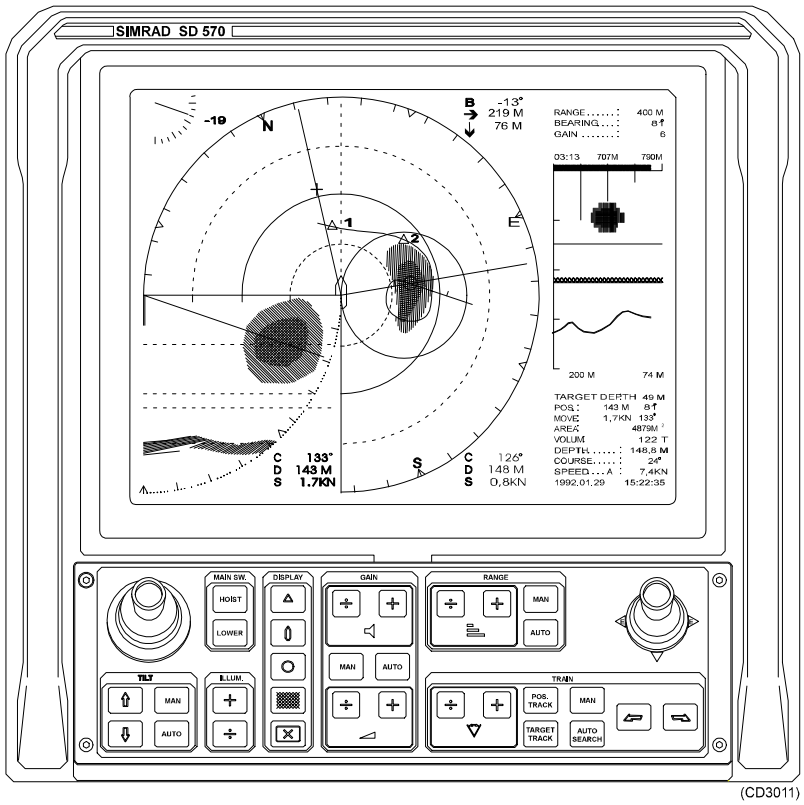


Figure 1 - Display and control panel

1.2 The main control panel

Figure 2 shows the main control panel. The following pages give a detailed description of each function, and for an inexperienced operator it is recommended to try the functions on an operative sonar while reading this chapter.

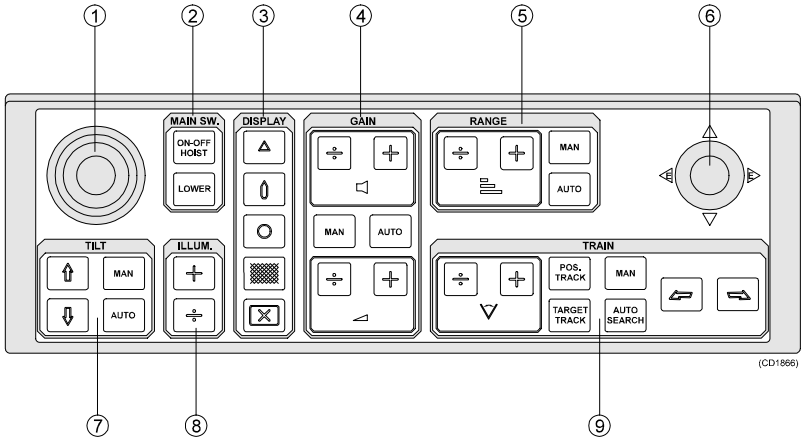
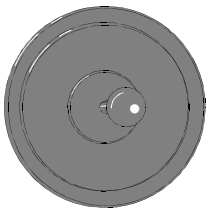


Figure 2 - The main control panel

1) Cursor joystick
2) Main switch
3) Display-oriented push buttons
4) Gain controls
5) Range controls
6) Menu joystick
7) Tilt controls
8) Illumination
9) Train controls

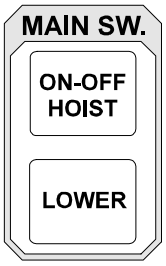


1. CURSOR JOYSTICK

This joystick is used to move the yellow cursor (+) on the display, and can be used for the following purposes, which will be described thoroughly for each function later in this chapter:

- **Distance, bearing and depth indication**
  for any position on the screen, with the readouts in yellow figures in the upper right-hand corner (lower corner for omni/vertical modes).
- **Target marker positioning**
  when using the TARGET MARKER push button.
- **Målmarkør-posisjonering**
  ved bruk av MÅLMARKØR trykknappen.
- **Circle marker positioning**
  when using the CIRCLE MARKER push button.
- **Manual target tracking**
  for calculation of the target movement between the two latest selected TARGET MARKERS.
- **Selection of position to be tracked**
  when using the POSITION TRACK push button.
- **Selecting of target to be tracked**
  when moving the cursor to a target and using the TARGET TRACK push button.
- **Selecting of new display centre**
  when using the DISPLAY CENTRE push button in TRUE MOTION mode.

The joystick can be moved in any direction. The speed of the cursor increases with the movement of the joystick. The joystick is self-centring, and the cursor will remain in the selected position until it is used for one of the above-mentioned purposes.



2. MAIN SWITCH

The main switch controls the mains power to the sonar, the lowering and hoisting of the transducer, and indicates the transducer position.

Note !

Before lowering the transducer, check that the depth of water below the vessel is sufficient, and that the vessel's speed is below 15 knots. This is the maximum speed specified with the transducer lowered.

ON-OFF
In order to start up the sonar, press the ON-OFF/HOIST button for approx. two seconds. The button lights up and indicates that the transducer is in upper position. To be able to switch off the sonar, the transducer must be in upper position. Press the button for approx. two seconds, until the sonar is switched off.

WARNING !

If the Sonar Control Unit is switched OFF due to, for example, power failure, with the Hull Unit lowered, the Hull Unit must be raised by using the hoisting/lowering switch in the motor control unit, or by the hand crank (refer to section Maintenance).

HOISTING
If the transducer is in the lower position, the transducer can be hoisted to the upper or middle position with the ON-OFF/HOIST button. The selected transducer position is shown on the upper line in the menu field.

- MIDDLE position is selected by a normal short press on the button.
- UPPER position is selected by pressing the button for approx. two seconds.

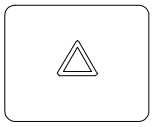
LOWERING
If the transducer is in the upper position, the transducer can be lowered to the lower or middle position with the LOWER button. Selected transducer position is shown on the upper line in the menu field.

- MIDDLE position is selected by a normal short press on the button.
- LOWER position is selected by pressing the button for approx. two seconds.

TRANSDUCER POSITION

In addition to the indicated transducer position on the upper line in the menu field, the lights in the ON-OFF/HOIST and LOWER buttons will also indicate the transducer position:

- The ON-OFF/HOIST button lights with the transducer in UPPER position.
- The LOWER button lights with the transducer in LOWER position.
- No button lights with the transducer in MIDDLE position.
- Both buttons lights when the transducer is hoisting or lowering.



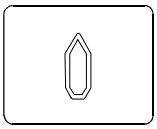
3. DISPLAY-ORIENTED PUSH BUTTONS

TARGET MARKER
To set a target marker, move the cursor to the target and press the button. A triangle symbol with a corresponding number will then appear at the cursor position. 8 numbered target markers may be shown simultaneously. When more than 8 markers are positioned, the oldest one is erased. The position data for 8 markers is displayed in the MARKERS menu.

The sonar keeps track of the markers even outside the display.

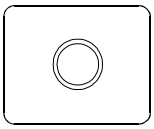
The target marker can also be used for MANUAL TARGET TRACKING, because the sonar calculates the speed (S), course (C) and distance (D) between the two last selected target markers. The result is displayed in white figures in the lower right corner (left corner in AUDIO or ECHOSOUNDER modes). The calculated result will be displayed for 3 minutes.

In addition to be used for target tracking, this is also useful for distance measurements between two selected positions.



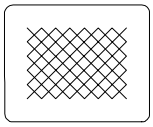
OWN SHIP MARKER
A square marker is displayed on the own ship symbol when the button is pressed. The marker will then be locked to that geographic position.

As with the target markers, this marker is given a number, and its position data is also displayed in the MARKERS menu.



CIRCLE MARKER
To set the circle marker, move the cursor to the desired position and press the button. A circle symbol will appear at the cursor position, and the button will light. The size of the symbol will be equal to the selected seine net if a net is selected in the GEAR menu, or equal to net no. 1 if a trawl symbol is selected.

To erase the circle symbol, press the button once more.



GEAR SYMBOL

The gear symbol can be a seine circle or a trawl symbol, depending on the selection in the GEAR menu.

Seine circle:
To set a seine symbol, first press the GEAR button once. The button lights, and the seine circle appears in front of the ship symbol, on the side that is selected in the GEAR menu. The seine circle will now follow the ship's movements.

At the moment the setting of the seine starts, press the GEAR button again. The seine circle will now be stationary to indicate the ideal ship's path for the seine setting. A square symbol indicates the starting point, another square shows the half-seine out, and a third square shows the end of the seine.

Trawl symbol:
The trawl data can be set manually in the GEAR menu, or automatically by connecting the SIMRAD FS 3000 or ITI trawl monitoring system to the sonar system.

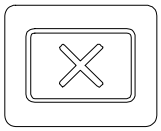
In the manual mode, the trawl symbol will be displayed on the ship's course line, with the selected depth and distance.

If the FS 3000 trawl sonar is connected, the trawl symbol will automatically be displayed in correct depth in the vertical display modes.

If the ITI trawl system is connected, the trawl symbol will be displayed with correct distance, bearing and depth. In addition, the trawl opening, temperature, and trawl filling indicator may be displayed.

Press the GEAR button to set the trawl symbol. The button lights and the trawl symbol appears on the display.

In the OMNI/VERTICAL mode, a long-dashed line will indicate the bearing of the left-hand side vertical slice. The first time the GEAR button is pressed, this line will become white and a 180° extension of the audio line. The second operation of the GEAR button will lock the left-hand slice to the trawl symbol, and the colour of the line will change to yellow.



This button has three functions:

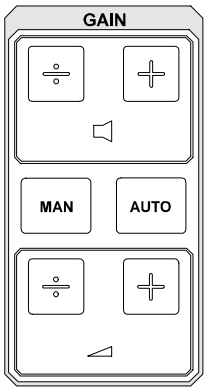
QUICK MODE SELECTION
Pressing this button in bow up mode gives a quick change to the 270° /vertical mode. This can be used for easy evaluation of the target, or for preparing the catching phase. Next operation of the button brings back the bow up mode.

DISPLAY CENTRE
In true motion mode, a new position of the ship symbol can be selected by moving the cursor to the wanted new position, and then pressing the button.

If position track or automatic target tracking is used in the true motion mode, the tracking point will be moved to the display centre when pressing the button.

ERASE ECHO
Pressing this button in other modes than bow up or true motion erases all echoes, except the stored echoes from the audio channel and the echo sounder.

The main purpose of using erase is to "clean up" the screen when 11° sector mode is used, or to erase old echoes in the catch data page in the menu field.



4. GAIN CONTROLS

VOLUME

The two upper push buttons control the volume of the audio channel in the loudspeaker. The audio channel is shown with a continual white line, and can be trained by the train controls. Also note that the size of the audio sector can be changed from 11° to 99° in the menu (chapter 5.10).

MAN/AUTO GAIN

These two push buttons are used to simplify the ON/OFF selection of the AGC and the RCG.

The selection adjusts the AGC and the RCG to the following menu settings:

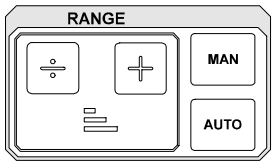
MAN		AUTO	
AGC.....:	OFF	AGC.....:	MEDIUM
RCG.....:	OFF	RCG.....:	MEDIUM

Note that the GAIN (see below) may be readjusted when selecting MAN/AUTO GAIN.

GAIN

The two lower push buttons control the total gain of the sonar. The gain is displayed in the upper right-hand corner of the display. The gain has 51 values, numbered from 0 to 50, and the receiver gain is changed 1 dB per step.

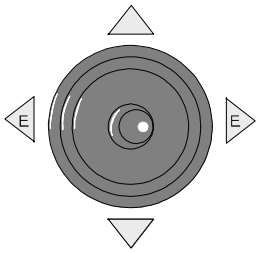
5. RANGE CONTROLS



The selected range is displayed in the upper right-hand corner of the display. The ranges are: 125, 250, 375, 500 , 750, 1000, 1500, 2000, 3000 and 4000 meters.

To make an optimal position tracking or target tracking programme, the range selection will go to AUTO when selecting these modes. To keep a steady display picture during seine setting, the lower automatic range is set to 400 meters. Changing the range or pressing the MAN button will stop the auto-ranging.

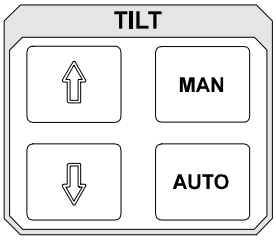
The sonar is designed to work with different range measurement units such as meters or feet for distance, and meters, feet or fathoms for depth. The choice can be made in the CONSTANTS menu.



6. MENU JOYSTICK

This joystick controls the menu operation, and can be moved in four directions: up, down, left and right. The up and down movement is used to move the menu cursor (inverted video) up and down in the menu, and the left and right movement is used as an ENTER function.

When the menu cursor is in the main menu or the extra menu, and the menu joystick is moved to the left, a catch data page will appear in the menu field. There is one special page for seining and one for trawling, depending on the selection in the GEAR menu. For further explanation of these catch data pages, see chapters 5.24 and 5.25.



7. TILT CONTROLS

The tilt can be adjusted electronically from +10° to -90°. The tilt angle is normally repeated on the tilt indicator in the upper left-hand corner, but in some of the dual modes, the tilt angle is shown directly in the vertical slice.

MANUAL TILT
In manual mode, the transducer may be tilted within the limits of +10° to -90° by pressing the tilt up or down push buttons. By giving short pushes on the up/down buttons the tilt changes in 1° steps, while it changes continually when one of the buttons is pushed and held in position.

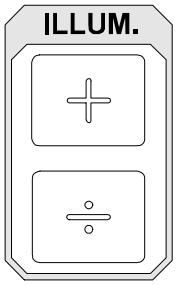
AUTO TILT
In auto mode the transducer will automatically tilt in steps within the selected tilt limits.

When AUTO is pressed, the tilt angle will form the centre of the tilt search, and the selected tilt limits are displayed on the tilt indicator with yellow lines, and by digits for the upper and lower tilt limit.

The tilt centre can be adjusted by using the tilt up/down buttons.

The tilt limits are adjusted by holding the AUTO button in the inner position and using the tilt up/down buttons to increase or decrease the sector.

The tilt step can be selected from 1° to 10° in the menu (chapter 5.11).



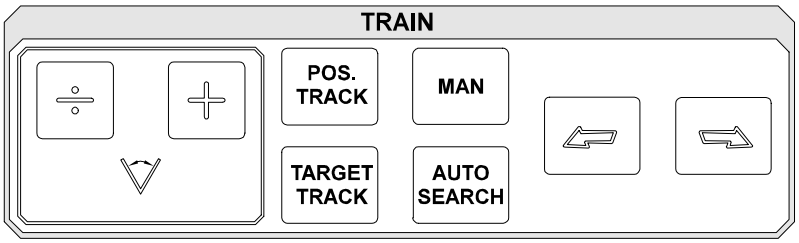
8. ILLUMINATION

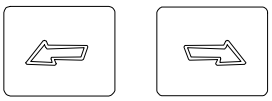
These buttons controls the backlights and signal lights in the push buttons.

In broad daylight only the signal lights may be selected by pressing the + button for maximum light and then releasing the button and giving it a new short press. Then only the signal lights will light up with maximum light.

9. TRAIN CONTROLS

The audio channel is shown with a continuous white line, and can be trained manually or automatically. The bearing angle is displayed in the upper right-hand corner of the display, indicated with 180° relative to the bow.





MANUAL TRAINING

In manual training, the audio channel can be trained continuously in either direction to the wanted bearing. The automatic training programme is overridden when the manual training knob is operated. When the activated button is released, the automatic search will continue. The bearing at the moment when the button was released will then be the new centre bearing of the search area.

AUTO SEARCH

In this mode the sonar will automatically search within the sector set by the search sector buttons.

The bearing at the time of pressing the button will be the centre of the search area.

The AUTO SEARCH button also has a stop/return function, which means that if the button is held in the inner position, the search will stop, and when it is released again, it will train in the opposite direction.

POSITION TRACK

This tracking programme is only fully activated when both course gyro and speed log are connected to the sonar system.

Place the cursor on the position to be tracked and press the button. A geographically fixed circle is then displayed, and the sonar will automatically track this position. The track sector angle is set by the SEARCH SECTOR buttons.

When auto tilt is used in position track, the tilt centre will automatically be adjusted in accordance with the distance to the tracked position.

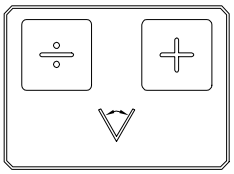
TARGET TRACK

The target tracking programme is activated by moving the cursor onto the target, and then pushing the button. A circle is displayed, and the sonar will track the strongest echo situated within the "window" indicated by the two lines on the bearing line. The window size may be changed by accessing the track window menu (chapter 5.13).

A line starting at the target's centre of gravity indicates the course and speed of the target. The length of the line increases with the speed, and one knot is indicated with a small mark on the line.

A course line is also displayed showing the target's track. All target readouts are given a light violet colour, and in addition to the readouts on the catch data page (refer to chapters 5.24 and 5.25), the speed, course and distance can for some modes also be found in the lower left-hand corner.

When auto tilt is used in target track, the tilt will automatically track the strongest echo.



Note that the manual training can be used to override the tracking programme.

SEARCH SECTOR

The search sector is only displayed in the automatic training programmes. The sector may be adjusted between 22° and 360° for any centre bearing.

In the auto search and position tracking programmes, the search sector is used for setting limits for the audio search.

In the target tracking programme, the search sector may be used to override the tracking limits.

2 THE MENU SYSTEM

The menu is displayed on the right–hand side of the display. In order to make an optimal use of the sonar for most types of operation, three different menus may be selected (refer to chapter 5.18.4).

The table below shows the contents of the main menu for the different submenus, with reference to the chapter in which the submenu is described.

MAIN MENU		REFER TO CHAPTER
SHORT	NORMAL & FULL	
MODE	MODE	5.1
	PULSE FORM	5.2
	TX POWER	5.3
	PING SECTOR	5.4
	TVG	5.5
AGC	AGC	5.6
RCG	RCG	5.7
PP FILTER	PP FILTER	5.8
COURSE	COURSE	5.21
SPEED	SPEED	5.22

The sonar is equipped with a battery memory that remembers all selected menu settings even if the sonar is switched off.

The menu settings marked with an asterisk indicate the normal settings which perform well under normal conditions. If one has got lost in the menu settings, a STANDARD function (see chapter 5.19) will bring up these normal settings.

If the cursor is moved below PP FILTER in the main menu, an extra menu will appear at the bottom of the menu field.

This information is normally hidden because these functions are seldom used, and the system is more easily operated with an uncluttered screen.

EXTRA MENU		REFER TO CHAPTER
SHORT	NORMAL & FULL	
MARKERS	MARKERS	5.9
	AUDIO SECTOR	5.10
	TILT STEP	5.11
	TRACK WINDOW	5.12
	COLOURTHRESH.	5.13
	DISPLAY GAIN	5.14
	WIND MARKER	5.15
	EXTERNAL SYNC	5.16
	COSMETICS	5.17
CONSTANTS	CONSTANTS	5.18
	STANDARD	5.19
	TEST	5.20

3 DISPLAY CONTROLS

Six display controls are located under the frame on the top of the display.

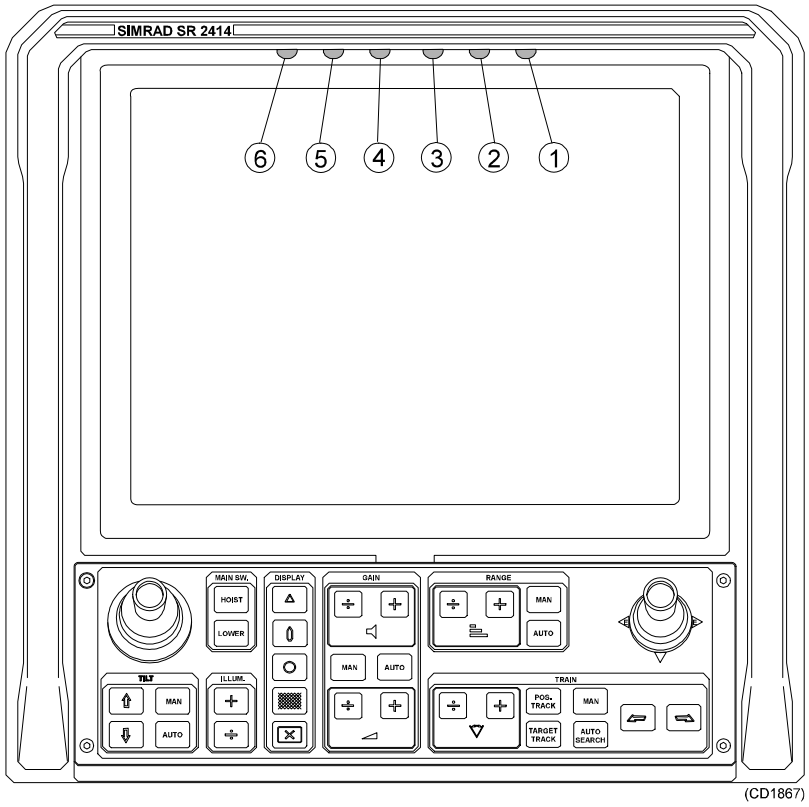


Figure 3 - Display controls

1. BRIGHTNESS — Adjusts the brightness of the display. turn the knob clockwise to increase the brightness.

2. CONTRAST — Adjusts the contrast on the display. Turn the knob clockwise to increase the contrast.

3. V–CENTER — Adjusts the vertical display position.

4. V–SIZE — Adjusts the vertical size.

5. H–CENTER — Adjusts the horizontal display position.

6. H–SIZE — Adjusts the horizontal size.

4 START AND STOP PROCEDURES

4.1 Start procedure

Note ! *Before starting up the sonar, check that the depth of water below the vessel is sufficient, and that the vessel's speed is below 15 knots, which is the maximum speed specified with the transducer lowered.*

The numbers in brackets refer to figure 2.

1 Switch on the sonar by pressing the ON-OFF/HOIST button (2) for approx. two seconds. The button lights green to indicate that the transducer is in the upper position.

2 Set the display contrast and brightness according to ambient light.

3 Press the LOWER button (2) until the selected transducer position on the upper line in the menu field shows SELECTED POS: LOWER. During the lowering, the text will change to LOWERING TO: LOWER. When the transducer is fully lowered, the text will change to TRANSD.POS: LOWER. the orange LOWER button will also light, to indicate that the transducer is fully lowered.

4 If the sonar is connected to a course gyro with stepper or synchro output, the menu on the display will now blink with the text: ADJUST COURSE, to remind you to adjust the course readout on the sonar to correspond with the course gyro. Adjust the course by means of the menu joystick (6) and enter the value by pushing the menu joystick to the right.

This completes the start procedure.

4.2 Stop procedure

1 Press the ON-OFF/HOIST button (2) until the selected transducer position on the upper line in the menu field shows SELECTED POS: UPPER. During the hoisting the text will change to HOISTING TO: UPPER. When the transducer is fully hoisted, the text will change to TRANSD.POS: UPPER. the green ON-OFF/HOIST button will also light, to indicate that the transducer is fully hoisted.

2 Switch off the sonar by pressing the ON-OFF/HOIST button (2) for approx. two seconds.

WARNING ! **If the Sonar Control Unit is switched OFF due to, for example, power failure, with the Hull Unit lowered, the Hull Unit must be raised by using the hoisting/lowering switch in the motor control unit, or by the hand crank (refer to section "Maintenance").**

5 MENU OPERATION

The menu joystick can be moved in four directions: up, down, to the right and to the left. The up and down movements are used to move the cursor (inverted video) up or down to the desired position. Movement to the right is used as the ENTER function, and will hereafter be called "press ENTER". Movement to the left is also used as an ENTER function, and when the menu cursor is in the main menu or the extra menu, this ENTER function will bring up a catch data page (see chapters 5.24 and 5.25).

```
TRANSD. POS:    LOWER
RANGE.....:   3500 M
BEARING....:     123°
GAIN.......:       8
MODE:          BOW UP
PULSE FORM.:*FM-AUTO
TX POWER...:    *FULL
PING SECTOR:    *OMNI
TVG........: *20 LOG
AGC........: *MEDIUM
RCG........: *MEDIUM
PP FILTER..: *MEDIUM
MARKERS
AUDIO SECT.:     *11°
TILT STEP..:      *2°
TRACKWINDOW: *MEDIUM
COLOURTHRES:       0
DISPL. GAIN:      *5
WIND MARKER:
EXT. SYNC..:     *OFF
COSMETICS
CONSTANTS
STANDARD
TEST

COURSE.....:     234°
SPEED.....A: 12.3 KN
1997.10.15  12:27:56
```

If the operator wishes to change one of the settings in the menu, the cursor must be moved up or down until it covers the desired function. Press ENTER, and the submenu for this control function will appear on the screen. The cursor will then be on the relevant setting.

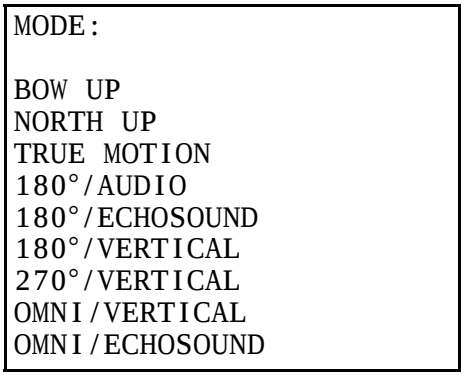
Move the cursor to the desired function and press ENTER to complete the operation. The submenu will disappear, and the new setting will now appear in the main menu.

Note that the cursor will stop in upper or lower position in the menu field when the joystick is kept in up or down position. When a new operation of the joystick is then made in the same direction, the menu cursor will jump to the opposite end of the menu.

This chapter describes all submenus of the main menu, the extra menu and the catch data pages. For an explanation of how to use the menu system, refer to chapter 2.

5.1 Mode

The sonar has nine different operational modes. To select the MODE submenu, move the menu cursor to MODE in the main menu and press ENTER.



Use the menu joystick once more to select the desired operational mode. The selected mode will then be displayed. When pressing ENTER, the submenu disappears, and the cursor goes back to the main menu. The various modes are described in section “Modes of operation”.

Note that the cursor will stop in upper or lower position in the submenu when the joystick is kept in up or down position. Then, when a new operation of the joystick is made in the same direction, the menu cursor will jump to the opposite end of the submenu.

5.2 Pulse form

With this function one may choose the form of the transmitter pulse:

```
PULSE FORM.:
  CW SHORT
  CW NORMAL
  CW LONG
 *FM AUTO
  FM 1
  FM 2
  FM 4
  FM 8
```

CW (Continuous wave):
The frequency of the transmitter pulse is here constant. There is a choice between three pulse lengths: short, normal and long. In addition, the length of the pulse will change automatically in accordance with chosen range. The table below shows the different pulse lengths for CW and FM. The pulse length is given in milliseconds (ms).

RANGE (meters)	CW – PULSE LENGTH (ms)			FM AUTO
	SHORT	NORMAL	LONG	
125	0.6	1.25	3.75	FM4
250	1.25	2.5	7.5	FM4
375	2	3.75	11.25	FM4
500	2.5	5	15	FM4
750	3.75	7.5	22.5	FM4
1000	5	10	30	FM8
1500	7.5	15	45	FM8
2000	10	20	50	FM8
3000	15	30	50	FM8
4000	20	40	50	FM8

FM (Frequency modulation):
In the FM mode the transmitter pulse is frequency modulated. This provides a stable echo presentation and greater ability of detection as noise and reverberation are reduced.

There is a choice between five different modes:

FM-AUTO: Chooses automatically the optimal number of frequencies (1-8) for selected range.

FM-1: Transmits one-frequency pulses with a total pulse length of 0.6 ms

FM-2: Transmits two-frequency pulses with a total pulse length of 2.5 ms

FM-4: Transmits four-frequency pulses with a total pulse length of 10 ms

FM-8: Transmits eight-frequency pulses with a total pulse length of 40 ms

The chosen number of frequencies are transmitted in one ping, and the receiver unit undertakes a spectrum analysis and compares the received echoes with the transmitter's frequency code. This provides a filtering effect which efficiently reduces noise and reverberation, thereby increasing the sonar's range.
The table on the previous page shows the maximum FM mode for all ranges. The maximum FM mode will automatically be selected when using FM-AUTO.

5.3 Transmission power

The transmitter operates with three different power settings in addition to OFF (passive).

```
TX POWER...:

 *FULL
  MEDIUM
  LOW
  OFF
```

The output voltage which can be checked on the voltmeter in the transceiver unit has the following values:

FULL:	90 V
MEDIUM:	40 V
LOW:	20 V

Note that the output voltage can drop as much as 30% during the transmission pulse.

5.4 Ping sector

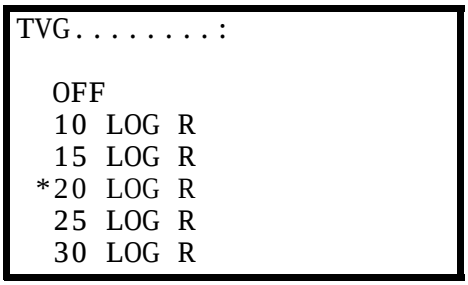
The ping sector is defined as the sector covered by one ping. The size of the sector can be selected between 360° (OMNI) and 11° (single beam).

```
PING SECTOR:

  *OMNI
   11°
```

When choosing 11°, the current bearing will be the centre of the beam. Furthermore, the beam can be turned manually by means of the train buttons, or automatically in the AUTO SEARCH or tracking programmes.

5.5 TVG (Time Variable Gain)

The TVG controls the gain in the signal amplifier. The gain is weakest just after the ping and increases in accordance with time (and therefore distance). The TVG reaches the maximum gain at 1000 meters.



In addition to OFF, the TVG can be selected with five different curve slopes, each having different gain regulation. The line in the menu marked with an asterisk shows the theoretically correct setting (20 log R). With this setting, the gain is adjusted in such a way that a school of fish with a certain size and density will be presented with approximately the same strength on the screen in any position inside the regulated TVG range.

5.6 AGC (Automatic Gain Control)

This control adjusts the gain in the sonar's preamplifier dependent on the strength of the incoming echo signals. The result is a filter-effect reducing noise and reverberation.

As shown in the menu, the AGC has four different settings:

OFF - no adjustment
WEAK - slow adjustment
MEDIUM - medium fast adjustment
STRONG - fast adjustment

Note that the AGC is sensing the echo strength in the audio channel, and use this as a basis for a common adjustment for all the receiver beams.

5.7 RCG (Reverberation Controlled Gain)

The RCG function is individual for each of the 32 receiving beams. Signals with small variations, like propeller noise, surface and bottom reverberation will be eliminated, while signals with fast variations, like target echoes or bottom echoes will not be removed.

```
RCG.........:
   OFF
   WEAK
  *MEDIUM
   STRONG
```

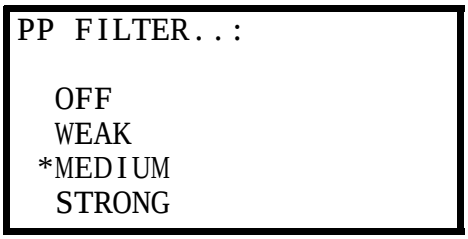
As shown in the menu the RCG function has four different settings. It is difficult to tell which is the best for extreme varying sonar conditions, but with experience and by repeated usage one will discover the best setting for any given situation.

The normal gain setting when RCG is OFF is 0-3. The optimal gain setting when using RCG is normally gain 6.

Note that scattered fish can be perceived as reverberation, so therefore the RCG should be used with care if scattered schools are to be detected.

5.8 PP Filter

The sonar is equipped with a ping-to-ping filter in order to reduce all unwanted noise and echoes from the screen. The filter has three different strengths:



As the ping-to-ping filter compares the echoes from the last 2 (WEAK), 4 (MEDIUM) or 8 (STRONG) pings, it will take this selected amount of pings to make a stable presentation when changing most of the sonar functions.

When selecting PP Filter, an extra interference filter will also be activated to reduce the interference from other vessels.

The filtering routine takes the vessel's speed into consideration when comparing the echoes from ping to ping.

Note that in rough seas, when the beam can easily miss the target in several pings, the PP filter should be used with care.

5.9 Markers

This menu shows position data (distance, bearing and depth) for the markers in the sonar picture. Positioning of markers is described in chapter 1.2.(3) "Display oriented push buttons".

```
MARKERS

M  DIST. BEAR DEPT
1 12345 -134  1234
2   564   89   120
3  1567  121   675
4  1234  143   566
5   876  113    98
6   832  -78   176
7   854    9   123
8    88 -173    46
C   455  131    76
```

A maximum of eight markers can be positioned at one time. If this number is exceeded, the marker first selected will be replaced by the one last selected. "C" on the bottom line shows the position data of the moveable marker cross. If automatic tracking is used, a "T" will show the position data for the tracking circle.

As the numbered markers are locked geographically they may move outside the screen. The computer keeps track of all markers inside a radius of 60 kilometers. Outside this radius the position data will be replaced by a row of x'es.

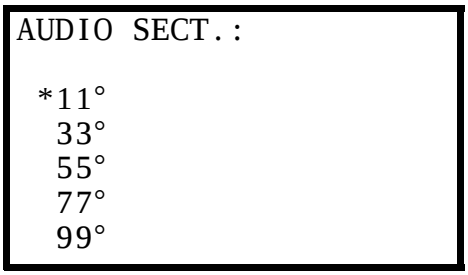
To present the bearing line to a selected marker, move the menu cursor to the relevant marker. To erase a marker, move the menu cursor to the relevant marker. Press ENTER and this submenu will appear:

```
MARKER NO:      5
ERASE MARKER

 NO
 YES
```

This is also intended as a "regret function" if one by mistake has pressed ENTER after selecting a bearing line.

5.10 Audio sector

The audio sector is the part of the ping which is reflected in the audio channel. The size of the sector can be selected from the menu:

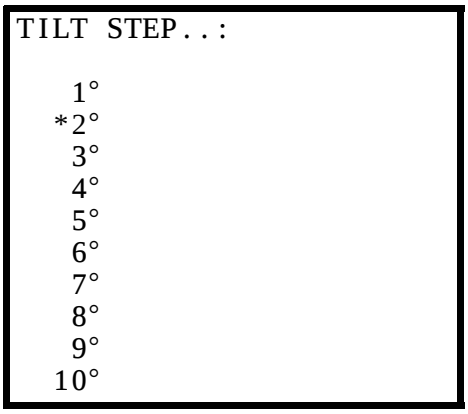


When using AUTO SEARCH for audio search, the step of the search will be equal to the selected audio sector.

Note that the audio sector can never be larger than the ping sector if a ping sector of 11° is used.

5.11 Tilt step

When AUTO TILT has been selected, the tilt step function is used to decide by how many degrees the tilt angle is to be changed for each ping.



The limits for the tilt searches are set by the tilt controls at the operator's panel (see description of tilt control).

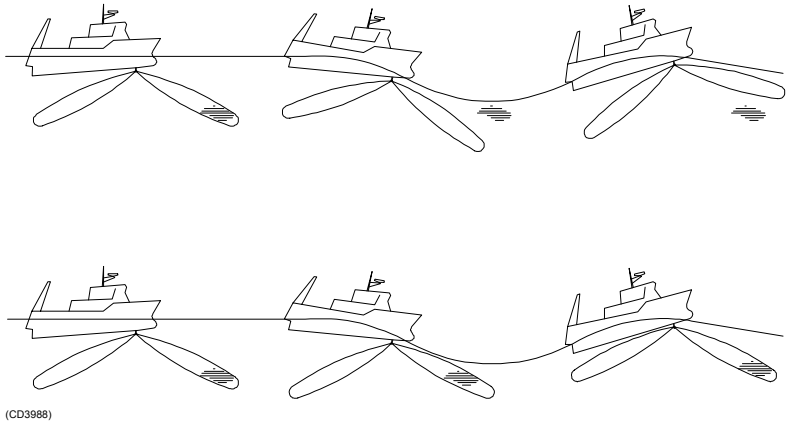
5.12 Track window

This function is only used when target tracking is selected.

```
TRACKWINDOW:

  SMALL
 *MEDIUM
  LARGE
```

The selected target window is presented on the bearing line. As the sonar will follow the strongest echo inside this window, it is used to prevent the sonar from locking to surface or bottom echoes close to the desired echo. The window is automatically centred on the strongest part of the echo.

The size of the window is normally set to MEDIUM, but if the target is small and the surroundings full of noise, a SMALL window should be selected. However, if the target is large, a LARGE window is preferred.



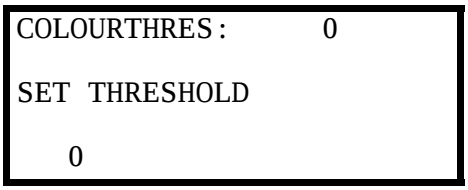
(CD3988)

When the stabilization is used, this also allows the use of the PP filter in rough seas. This will give a cleaner and more stable echo presentation.

5.13 Colour threshold

The strength of the echoes is presented by a scale of 32 colours on the screen. A weak echo has a cold colour (blue), medium echoes warmer colours (green, yellow) and strong echoes the warmest colours (orange, red).

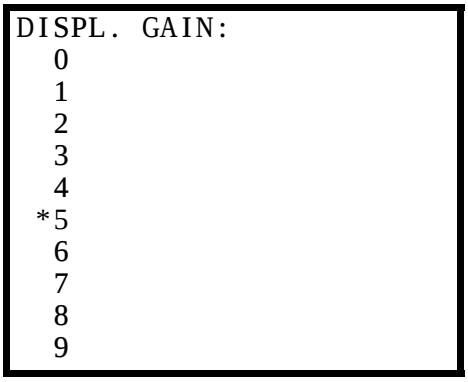
If desired, the number of colours may be reduced. In that case one starts with the colour representing the weakest echo. The number of colours that can be reduced depends on the selected menu colour.



Note that by reducing colours, the maximum detection range will be reduced. This because all echoes normally will appear as weak echoes on the display at long range.

5.14 Display gain

Display gain increases or decreases the colour threshold on the screen.



Display gain only controls the presentation on the screen, it is the gain control on the front panel which controls the receiver's total gain.

5.15 Wind marker

A wind marker can be selected in the menu for COSMETICS (see chapter 5.17). The marker which can be used to indicate the wind or current direction, has to be adjusted manually.

```
WIND MARKER:   123°

SET WIND DIRECTION
 360°
   0°
```

5.16 External synchronizing

In order to eliminate interference from other equipment on board, the sonar's trigger pulse can be synchronized with the other equipment's trigger pulse. The external trigger pulse must then be connected to the sonar.

```
EXT.SYNC...:

 *OFF
  ON
```

This menu is used to switch the synchronizing input ON/OFF. If switched ON, the sonar will wait for a trigger pulse before starting a new transmission. This wait state has a timeout of five seconds, whereafter the sonar will start a new transmission.

When using external synchronizing, the sonar's ping rate will be reduced.

5.17 Cosmetics

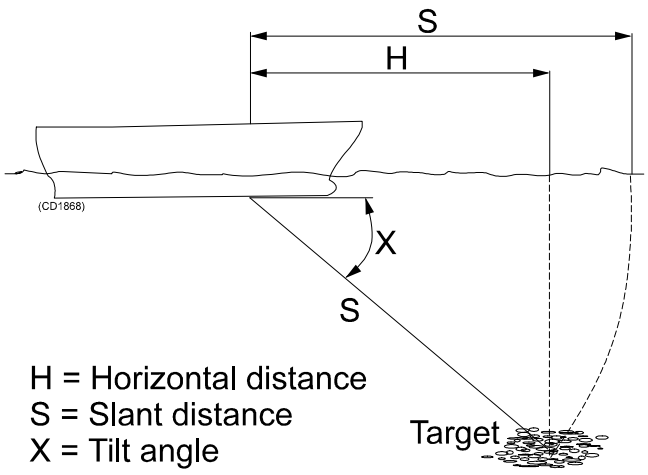
This menu is used to choose different ″cosmetics″ on the screen.

```
COSMETICS:

ECHO DISTANC:HORIZ
BEARING CARD:  OFF
COMPASS CARD:   ON
DIST. RINGS.:   ON
CURSOR RING.:   ON
CURSOR BEAR.:   ON
BOW MARKER..:   ON
COURSE LINE.:   ON
MINUTE MARK.:   ON
WIND MARKER.:   ON
VERT. RING..:   ON
```

Similar to other menu selections, desired cosmetics are stored in a battery operated memory. The sonar will therefore remember them even if the unit is switched off.

```
ECHO DISTANC:

 HORIZONTAL
 SLANT
```

With this function one may choose presentation of echo distance on the screen.



With HORIZONTAL presentation, the echo distance is the distance which the vessel must sail in order to come on top of the target.

With SLANT presentation the distance to the target is measured along the tilt angle.

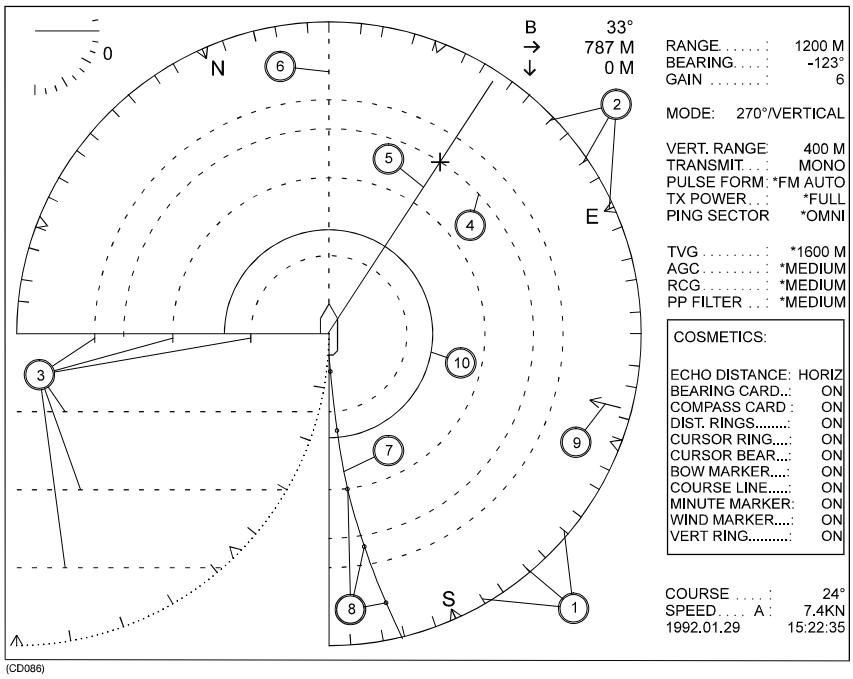


Figure 4 - Display cosmetics

The rest of the submenus for cosmetics have normal ON/OFF functions.

1. Bearing card
2. Compass card
3. Distance rings
4. Cursor ring
5. Cursor bearing
6. Bow marker
7. Course line
8. Minute markers
9. Wind marker
10. Vertical ring

1 The **BEARING CARD** is shown in white colour outermost in the echo ring, and is relative to the ship's bow. The bearing card has a stroke for each 10°.

2 The **COMPASS CARD** is also shown outermost in the echo ring, but in a yellow colour. Because this compass card is a replica of the course readout in the lower right-hand corner, and always depends on a correct adjustment and interfacing to the gyro, this readout should never be used for navigation.

3 The **DISTANCE RINGS** are shown with white dashed rings in the horizontal pictures, and white dashed lines in the vertical pictures. The distance rings and lines divide the total range into four, to make it easier to calculate the distance or depth to a target.

4 The **CURSOR RING** is a yellow dashed ring with a radius like the distance to the yellow cursor cross. The size of the ring will change when operating the cursor joystick, and it can then be used for distance measurements.

5 The **CURSOR BEARING** is a yellow line from the ship symbol through the yellow cursor cross, and can be used for bearing measurements.

6 The **BOW MARKER** is a white dashed line which is an extension of the bow or the sailing direction. This marker is useful as a sight for the ship's manoeuvring.

7 The **COURSE LINE** indicates the ship's and targets' movement as a path after the symbol. The length of the course line depends on the manoeuvring of the symbol. To erase the course line, it has to be "switched OFF" in this menu.

8 The **MINUTE MARKERS** are shown as small circles on the ship's and targets' course line. In the audio and echo sounder modes, they are shown as small lines at the top of the recordings.

9 The **WIND MARKER** is indicated in the outermost area of the echo presentation as an arrow. This arrow can be manually adjusted in the WIND MARKER menu to show the wind or current direction.

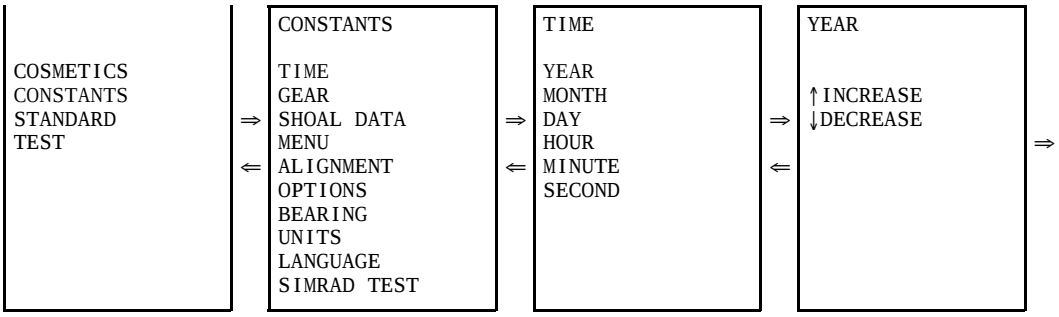
10 The **VERTICAL RING** shows the selected range of the vertical slice as a white circle in the horizontal picture. This will then be an indication of which distance a target should be presented in the vertical slice.

5.18 Constants

This submenu contains functions seldom used, or they are set permanently when the sonar is installed.

```
CONSTANTS

TIME
GEAR
SCHOOL DATA
MENU       : NORMAL
ALIGNMENT :   123°
OPTIONS
BEARING    :    REL
UNITS
LANGUAGE:  ENGLISH
SIMRAD TEST
```

The submenu for CONSTANTS contains several submenus. Below is an example of how to change the year in the TIME function. The arrows show how to choose both ways with the right/left operation of the menu joystick.



Some functions in CONSTANTS have less, while others have more submenus than presented in the illustration.

When pressing ENTER in the last submenu, the menu system will be brought back to the main menu or the extra menu.

A detailed description of each function follows on the next pages.

Time

Year, date and time is shown at the bottom of the main menu. This function is battery powered and continues even if the sonar is switched OFF. To change the setting, the TIME function is used.

```
TIME:

YEAR.....:     1997
MONTH....:       10
DAY......:       15
HOUR.....:       10
MINUTE...:        7
SECOND...:       31
```

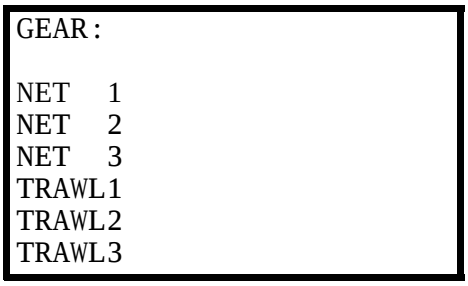
Setting of year, month, etc. is done by increasing/decreasing the function as shown in the example below:

```
YEAR.....:     1997

 INCREASE
 DECREASE
```

Note that time starts running only when ENTER is pressed.

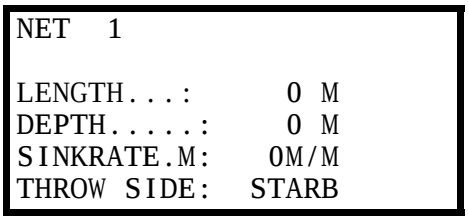
Gear

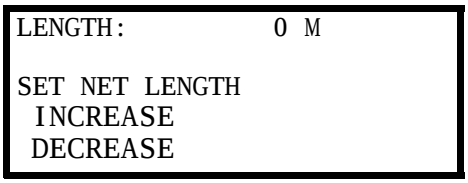
This function is used for selection of fishing gear and to program data for this. It is possible to preprogram the system for three different seines and three different trawls to get the right size and position of the gear symbol on the display.

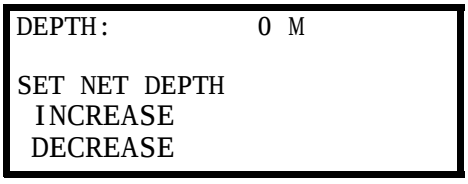


When the fishing gear has been selected, a menu for setting of relevant equipment data will appear. In the examples below menus for both seine and trawl are shown.

NET DATA







```
SINKRATE.M:  0 M/M

SET SINKRATE
IN METER/MINUTE
 INCREASE
 DECREASE

SET -1 FOR AUTO
WITH DEPTH SENSOR
```

```
THROW SIDE:

STARB
PORT
```

TRAWL DATA

```
TRAWL  1

DISTANCE.M.:    0 M
DEPTH....M:     0 M
HEIGHT...M:     0 M
WIDTH....M:     0 M
```

```
DISTANCE.M:     0 M

SET TRAWL DISTANCE
 INCREASE
 DECREASE

SET -1 FOR AUTO
WITH TRAWL SONDE
```

```
DEPTH....M:     0 M

SET TRAWL DEPTH
 SHALLOW
 DEEPER

SET -1 FOR AUTO
WITH DEPTH SENSOR
```

```
HEIGHT...M:    0 M

SET TRAWL HEIGHT
 INCREASE
 DECREASE

SET -1 FOR AUTO
WITH TRAWL SONDE
```

```
WIDTH....M:    0 M

SET TRAWL WIDTH
 INCREASE
 DECREASE

SET -1 FOR AUTO
WITH TRAWL SONDE
```

School data

This function is used to obtain information on the volume in tons and the movement of a school when the sonar is in the automatic target tracking programme.

```
SCHOOL DATA

TYPE OF FISH
MOVEMENT          0
```

When TYPE OF FISH is selected, the presumed tons per 1000 m^2 is presented.

```
TYPE OF FISH:

OFF
CAPELIN...:      25
HERRING...:      25
MACKEREL..:      25
BL.WHITING:      25
OWN SCHOOL:      25
```

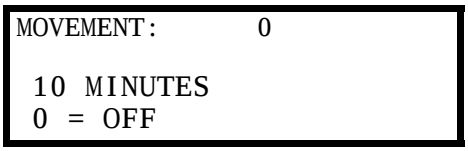
Four types of known fish plus OWN SCHOOL can be selected. Assumed value for all five types can be adjusted according to experience by use of the menu below:

```
CAPELIN...:      10
 INCREASE
25 TONS PER 1000M2
 DECREASE
```

Estimation of volume is based on tons per 1000 m^2 school area. The standard value is 25 tons per 1000 m^2, and the operator may adjust this figure with the INCREASE/DECREASE function.

In order to estimate total volume of fish in a school, the school must be tracked in the target tracking programme. The result of the volume calculations is shown in the page for CATCH DATA. This page is selected by pressing the menu control to the left when the cursor is in the main menu.

By using the MOVEMENT function it is possible to calculate the position of a school being target tracked at any given time:



It is here possible to estimate the position of the school at a given time (from one to ten minutes). The basis for the calculation is the motion of the bulk of the school. Estimated school position is presented by a violet dot. The time for the estimation is selected in the submenu. When selecting 0, the movement estimation is switched OFF.

Menu

There is a choice between three different modes of menu operation:

```
MENU.....: NORMAL

SHORT
NORMAL
FULL
```

The two tables in chapter 2 show the differences between SHORT and NORMAL/FULL menu operation.

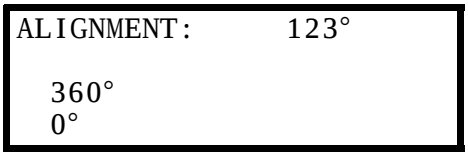
SHORT
This shortened menu version is recommended for novice sonar operators. All settings not included here are set to the standard settings which will perform well for most conditions.

NORMAL
This menu contains all changeable sonar parameters. All settings are equal for both the horizontal and the vertical picture except for the range which may be selected separately for the vertical slice.

FULL
This extended menu is mainly equal to the NORMAL menu, but in addition most parameters for the vertical slice can be selected separately from the horizontal settings (refer to chapter 5.23). This because the settings for the horizontal picture seldom is fully optimal for the vertical slice.

Alignment

If the Hull Unit is installed differently from what is recommended (0° mark towards the bow), the echo picture has to be aligned on the display. The complete alignment procedure is described in section "Start-up procedures" in the Installation Manual.



To increase the angle, press the joystick upwards, and to decrease the value, press the joystick downwards.

When the alignment is checked to be correct, write the angle here:

ALIGNMENT CORRECTION:.....

Note !

In case of service on the Sonar Control Unit where software is changed or when complete reset is given to clear the software memory, the alignment angle has to be reselected to the value noted above.

Options

When connecting options (additional equipment), the sonar system must be told what has been connected. This is done by using the menu for options as shown below.

```
OPTIONS:

ECHOSOUND.:     ES500
TRAWL SYST:     ITI
DEPTH SENS:     NONE
```

```
ECHOSOUND.:

NONE
EQ50
EQ100
ES380
ES500
```

```
TRAWL SYST:

NONE
FS900
FS3300
ITI
```

```
DEPTH SENS:

NONE
ITI
```

Bearing

This function is used for selecting the bearing data to be relative to the ship, or to be true north readouts.

The following data will change when selecting relative or true bearing:

- Cursor bearing readout.
- Wind direction.
- Markers bearing in the MARKERS menu.
- Target position bearing on the catch data page.

The following data is permanent, and will not change when selecting relative or true bearing.

- The bearing of the audio line is always relative to the ship.
- The ship's course is always true north.
- The course of the target in manual and automatic target tracking, is always true north.

Note that there is no indication in any of the readouts if it is in relative or true bearing.

Units

This function is used for selecting desired units on the screen.

```
UNITS:

HORIZONTAL:   METER
VERTICAL..:   METER
TEMP......:   °CELS
```

```
HORIZONTAL.:

METER
FEET
```

```
VERTICAL..:

METER
FATHOMS
FEET
```

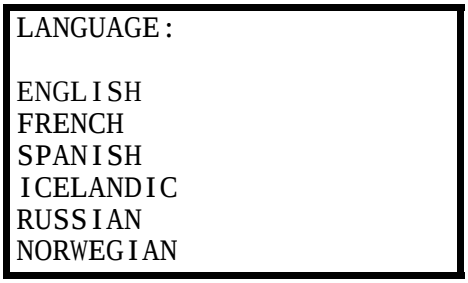
Note that the sonar has been designed with METERS as the basic unit for measurements. By selecting FEET or FATHOMS, the scale for range may produce some strange values as these are computed from the original meter scale.

```
TEMP......:

°CELS
°FAHR
```

The temperature selection is only valid when the sonar is connected to the Simrad ITI trawl system.

Language

The sonar is usually delivered with English menu texts. By using the LANGUAGES menu any listed language can be selected.



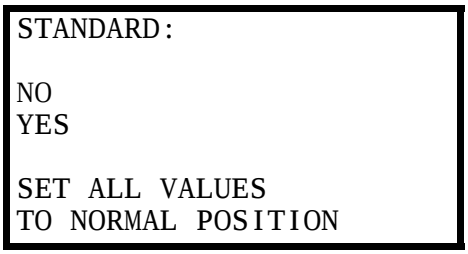
Language is normally selected at installation.

Simrad test

These tests are only used for start-up and service purposes.

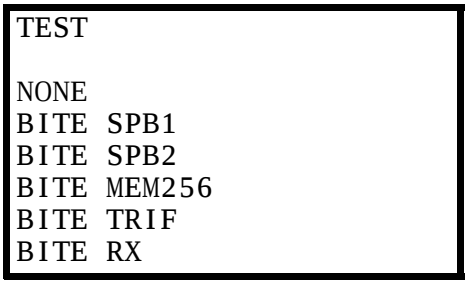
5.19 Standard

The sonar is equipped with a battery memory which will remember all selected settings even if the sonar is switched off. The STANDARDS function might be of assistance if one has got lost in the settings.



When STANDARD is selected, the settings of the sonar will revert to normal preset mode which will perform well under normal conditions. The settings which are affected when STANDARD is selected are marked with an asterisk in the menus. From the familiar settings the operator may then modify as desired.

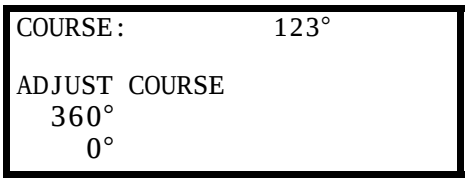
5.20 Test



The BITE (Built In Test Equipment) system is normally used for test and service in case of faults in the system.

5.21 Course

If a gyro with a stepper or synchro output is connected to the sonar, the text ADJUST COURSE will be shown every time the sonar system is switched ON. This is a reminder that the course shown on the screen must be adjusted in accordance with the gyro course.



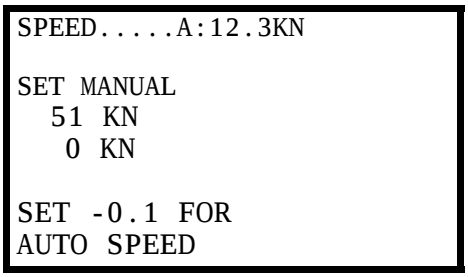
To increase the course value, press the joystick upwards, and to decrease the value, press the joystick downwards.

When the course on the screen corresponds to the gyro course, press ENTER and check that the course is correct.

Note ! *The course on the screen must not be used for navigation.*

5.22 Speed

When a speed log is connected to the sonar system the indicated speed automatically complies with that of the speed log. If the speed log system is faulty or if a log is not connected, the speed can be set manually as explained in the submenu below.



Note ! *An inaccurate log or gyro input will cause inaccurate indication of the vessel and target movements.*

5.23 Vertical menu

When the menu system is selected to FULL (refer to chapter NO TAG), most parameters for the vertical picture can be selected separately in the vertical menu. This menu will appear under MODE in the main menu whenever a vertical menu is selected and the menu cursor is moved below MODE.

```
VERT.MENU:

RANGE.....:    250 M
GAIN......:      5
PULSE FORM.:    MAIN
TVG.......:     MAIN
AGC.......:     WEAK
RCG.......:     MAIN
PP FILTER..:    WEAK
```

In all submenus of the vertical menu, the word MAIN in the first line means that the parameter in question is equal to the settings in the normal horizontal menu.

```
RANGE.....:

  MAIN  125 M
  250 M
  375 M
  500 M
  750 M
 1000 M
 1500 M
 2000 M
 3000 M
 4000 M
```

Note that when the menu system is selected to NORMAL (refer to chapter NO TAG), only the vertical range can be selected separately for the vertical pictures.

5.24 Catch data page for purse seiners

When the menu cursor is in the main menu or the extra menu, and the menu joystick is pressed to the left, a catch data page will be displayed in the menu field. There is one catch data page for purse seiners and one for trawlers, stated with the NET or TRAWL selection in the GEAR menu.

In order to get the school presentation and the school data, the automatic target tracking must be used. The vertical distribution of the school is determined by the manual or automatic tilting of the sonar beam.

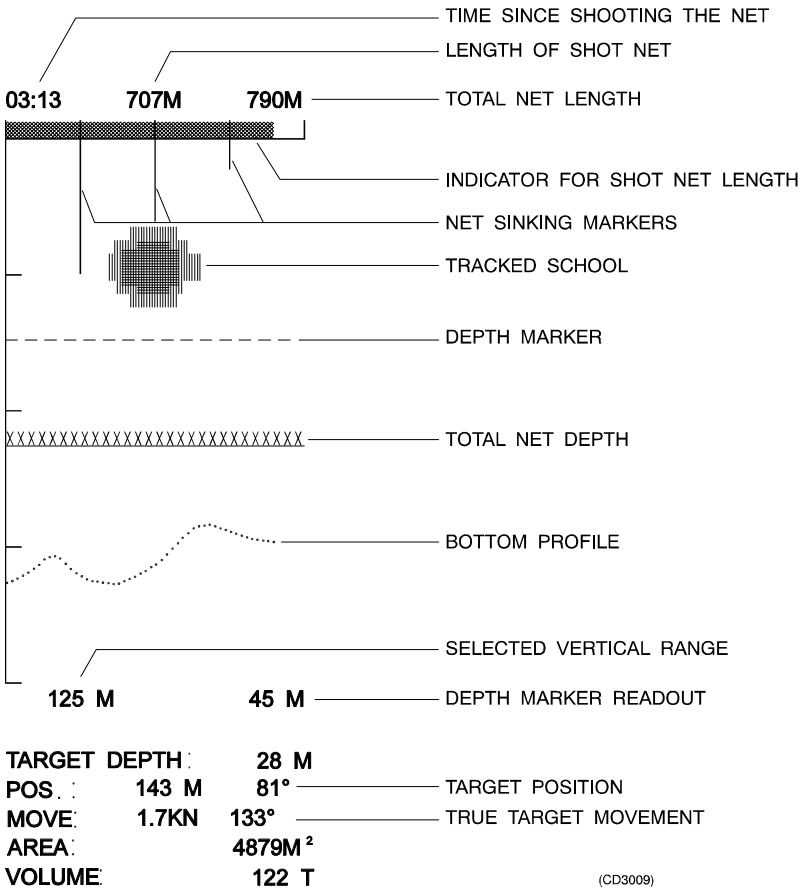


Figure 5 - Catch data page for purse seining

When the seine circle is selected, and the GEAR button is pressed when shooting the net, both the time and the amount of the shot net start running. If an echo sounder is connected to the sonar, the bottom profile will be drawn.

The indicators for the sinking of the net can be manually set by the sinking rate in the GEAR menu, or automatically when a depth sensor system is connected to the sonar.

The depth marker line with depth marker readout can be moved up and down by the menu joystick for depth measurements in the catch data page. The vertical range can be changed by moving this depth marker to the scale end.

The volume estimation of the school is based on the selected type of fish in the SCHOOL DATA menu. Note that this value can be adjusted according to experience.

5.25 Catch data page for trawlers

When a trawl is selected in the GEAR menu, and the menu cursor is in the main menu or the extra menu, the catch data page for trawling will be displayed in the menu field when the menu joystick is pressed to the left.

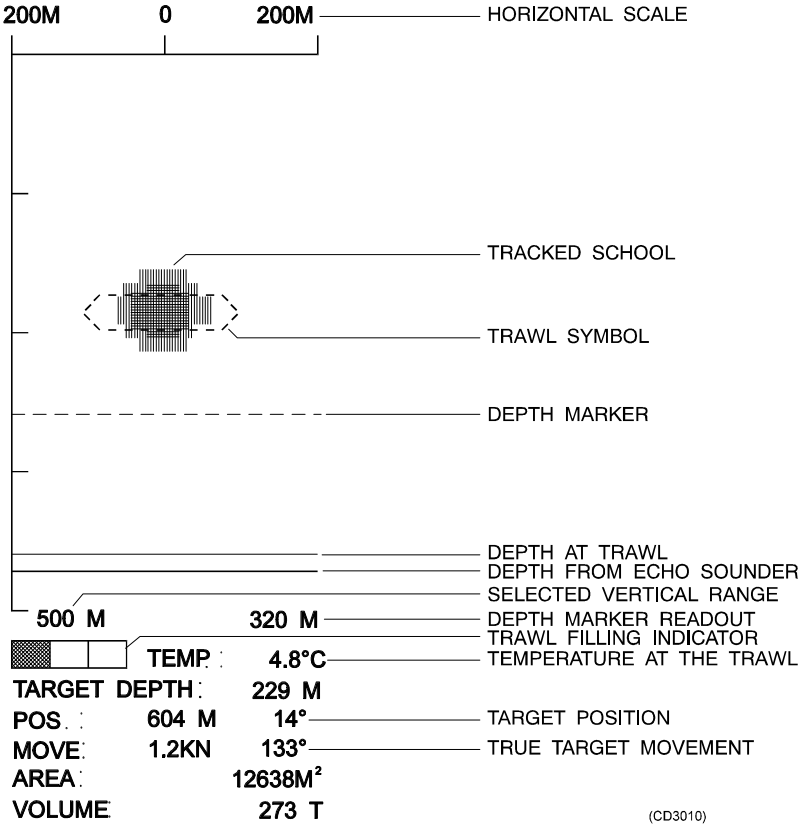


Figure 6 - Catch data page for trawling

In order to get the school presentation and the school data, the automatic target tracking must be used. The vertical distribution of the school is determined by manual or automatic tilting of the sonar beam. Note that the school on the catch data page can be out of centre because it depends on the position of the target's centre of gravity. The trawl symbol should always be sighted on the horizontal centre of this page.

When the trawl symbol is selected, and the extension of the trawl's course is inside a distance of 200 meters from the target, the trawl symbol should be visible on the catch data page.

The trawl opening size can be selected manually in the GEAR menu. The trawl depth can also be manually selected, or automatically if a Simrad FS 3300 or ITI trawl system is connected to the sonar.

If an echo sounder is connected to the sonar, a white bottom line will indicate the depth. If an ITI trawl system is connected, the depth at the trawl will also be indicated.

The depth marker line with depth marker readout can be moved up and down by the menu joystick, for depth measurements in the catch data page. The vertical range can be changed by moving this depth marker to the scale end.

The trawl filling indicators will only operate if an ITI trawl filling system is connected to the sonar.

The volume estimation of the school is based on the selected type of fish in the SCHOOL DATA menu. Note that this value can be adjusted according to experience.

850-160140 / AA000 / 3-14

SD570 Maintenance

This section deals with maintenance work that may be carried out by the user.

Document revisions

Rev	Date	Written by	Checked by	Approved by
A	13.01.97	CL	SØJ	SØJ
B				
C				
D				

(The original signatures are recorded in the company's logistic database)

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Document history

(The information on this page is for internal use)

Rev. A Original issue.

1 INTRODUCTION

This section deals with maintenance work that may be carried out by the user. In addition to cleaning the cabinets and dust filters, the user should inspect the sonar room at least once a week. The ventilation and heating system, as well as the bilge pump arrangement should then be checked to be in good working order.

The spare part box which is delivered with the sonar, contains fuses for the complete sonar. For location and replacing of these, refer to the chapter for the unit in question.

Major repairs and complete overhaul of the sonar, should be left to an authorized Simrad service engineer.

2 SONAR CONTROL UNIT

2.1 Cleaning

The cabinet should be kept clean and dry. Remove salt water residue with a soft cloth which has been moistened in fresh water. Do not use strong solvents.

Note ! *The display screen should be handled with care to avoid damaging the anti-glare filter coating. Use a soft cloth without any strong solvents when cleaning it.*

2.2 Dust filter

There is a dust filter on the air inlet at the rear wall of the Sonar Control Unit (refer to figure 1). To avoid overheating, this should be inspected, and if necessary, cleaned once every third month.

The filter is accessible by snapping off the plastic cover. The filter should be vacuum cleaned, or washed in soap and water. If washed, the filter must be dried thoroughly before being reinstalled.

2.3 Replacing fuses

The Sonar Control Unit is fused with two 3.15A slow blow fuses on the rear wall (refer to figure 1).

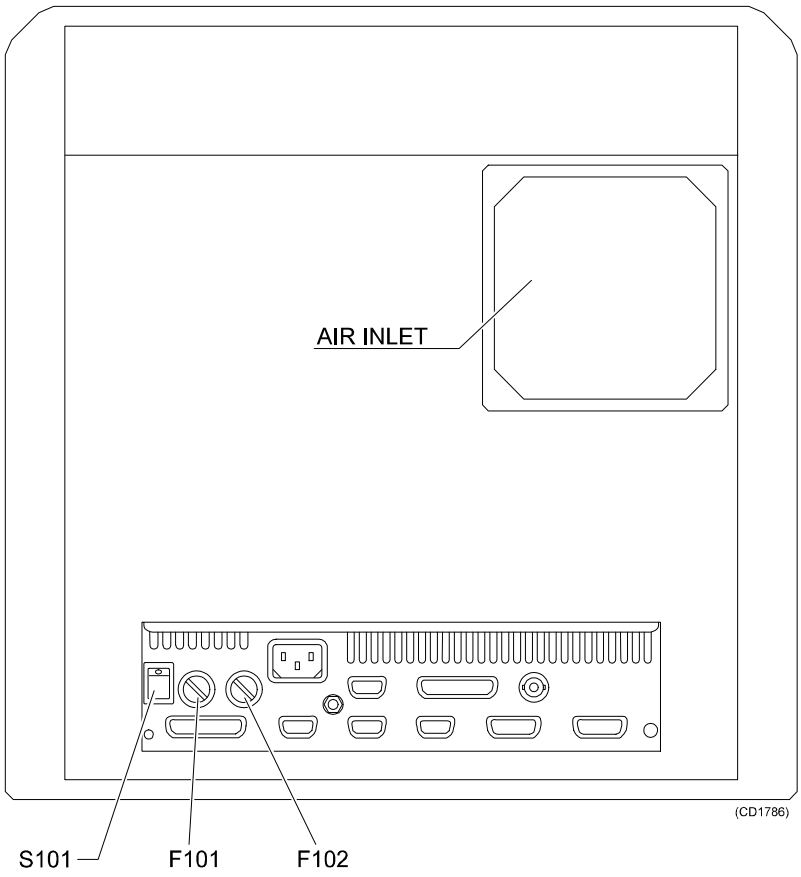

Figure 1 - Location of fuses in the Sonar Control Unit

Before changing fuses on the Sonar Control Unit, make sure that the mains power plug at the rear of the unit is correctly mounted.

Spare fuses are located in the spare parts box.

3 TRANSCEIVER UNIT

3.1 Dust filter

There is a dust filter in the bottom of the Transceiver Unit. To avoid overheating, this should be inspected, and if necessary, cleaned once every third month.

The dust filter is accessible from the outside of the Transceiver Unit, by unscrewing the eight finger nuts in the bottom of the unit. The filter should be vacuum cleaned, or washed in soap and water. If washed, the filter must be dried thoroughly before being reinstalled.

3.2 Replacing fuses

The Transceiver Unit is fused with two 8A slow blow main fuses (F201 and F202) located on the front of the Power Supply (see figure 2). If one of the fuses are blown, the lamp L201 should light and lamp L202 should be extinguished. If L201 does not light, check the fuses of the ship's main power system.

In addition, the High Voltage Unit is fused with two 8A slow blow fuses (F204 and F205 in figure 2). If one of the fuses is blown, the lamp L205 should light and lamp L206 should be extinguished.

Spare fuses are located in the spare parts box.

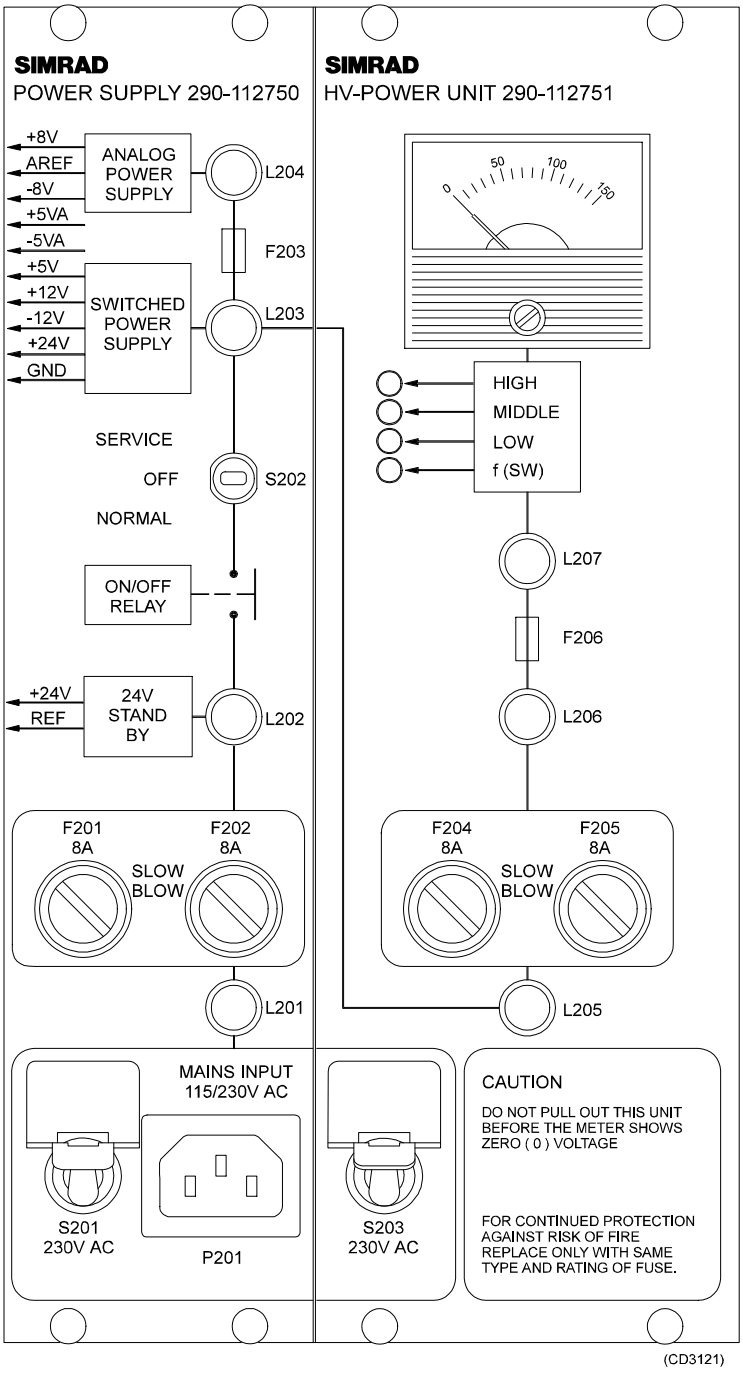

Figure 2 - The transceiver power system

4 HULL UNIT

4.1 General

The sonar hull unit should be under continuous watch as a part of the vessel's machinery. As it may be exposed to severe strain because of pitching and vibrations, it should be inspected for loose parts.

In addition to lubrication (see chapter 4.4), check for signs of corrosion. If required, clean the corroded areas and paint over with a high quality protective paint.

4.2 Docking the vessel

Whenever docking the vessel, the switch S101 at the rear of the Sonar Control Unit (refer to figure 1) must be switched OFF.

When docking the vessel, great care must be taken not to damage the sonar trunk and protecting blister.

On vessels which have been in dock, the Hull Unit should be examined and the hoist/lower functions should be tried out and watched while operating the hoisting/lowering switch (S302 in figure 3 in the motor control unit on the Hull Unit). The hoist/lower motor will automatically stop when the transducer shaft reaches the upper or lower limit switch.

Remember to set the hoisting/lowering switch back to REMOTE for normal operation.

After the vessel has been in dock, use the air bleeding plug (see figure 4) to get the air out of the trunk. Loosen the plug carefully two to three turns until the air inside the trunk starts blowing out. When water starts splashing, tighten up the screw.

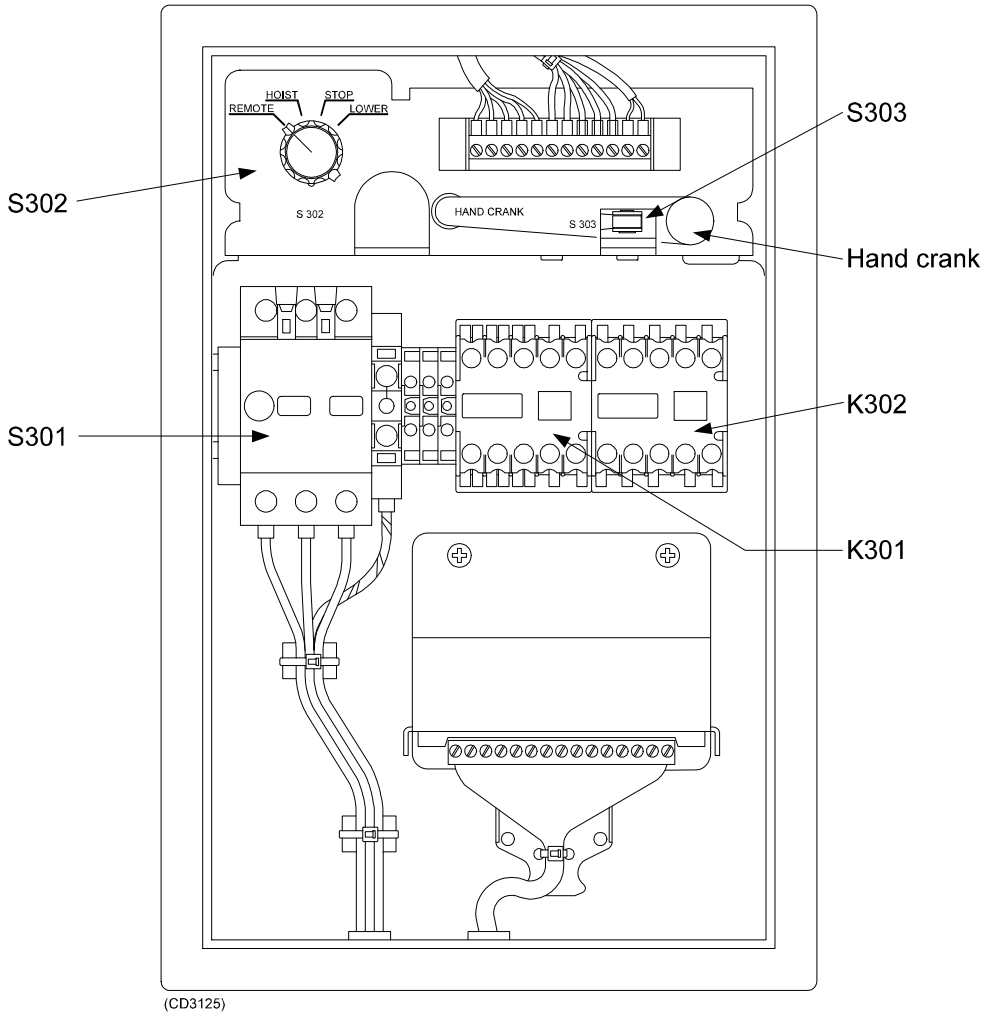

Figure 3 - The motor control unit

4.3 Cleaning the transducer

The transducer normally needs little attention. However, the transducer face should be inspected and cleaned when docking. Do not use strong solvents, but a normal synthetic soap and water. Marine growth should be carefully removed with fine–grade sandpaper or emery paper.

Note ! ***The transducer face must not be painted.***

4.4 Lubrication of the Hull Unit

From the factory, the Hull Unit is lubricated with the types of oil or grease as specified below. However, if of equal quality, other types may be utilized. The numbers below refer to the lubrication points on figure 4.

1 The ball bearing on the top of the hoist/lower screw should be lubricated with normal ball bearing grease.

2 The hoisting spindle should be lubricated with MOLYBDENUM DISULPHIDE GREASE.

3 Topping up the shaft sleeve through the grease nipple is only required if the shaft is dry of lubrication, or if water tends to force its way up along the shaft. Remember to open the pressure let–down plug when topping up. The shaft sleeve is filled with ESSO CACAR K1 from the factory.

4.5 Hoisting and lowering with hand crank

In case of emergency or for service purposes, the transducer may be hoisted and lowered by means of the hand crank, which is located in the motor control box on the Hull Unit.

1 First set the hoisting/lowering switch S302 to STOP (see figure 3).

2 Dismount the timing belt cover on the top of the Hull Unit and fasten the hand crank to the hoisting spindle as shown in figure 4.

3 Remember to set the hoisting/lowering switch back to REMOTE after the timing belt cover has been mounted.

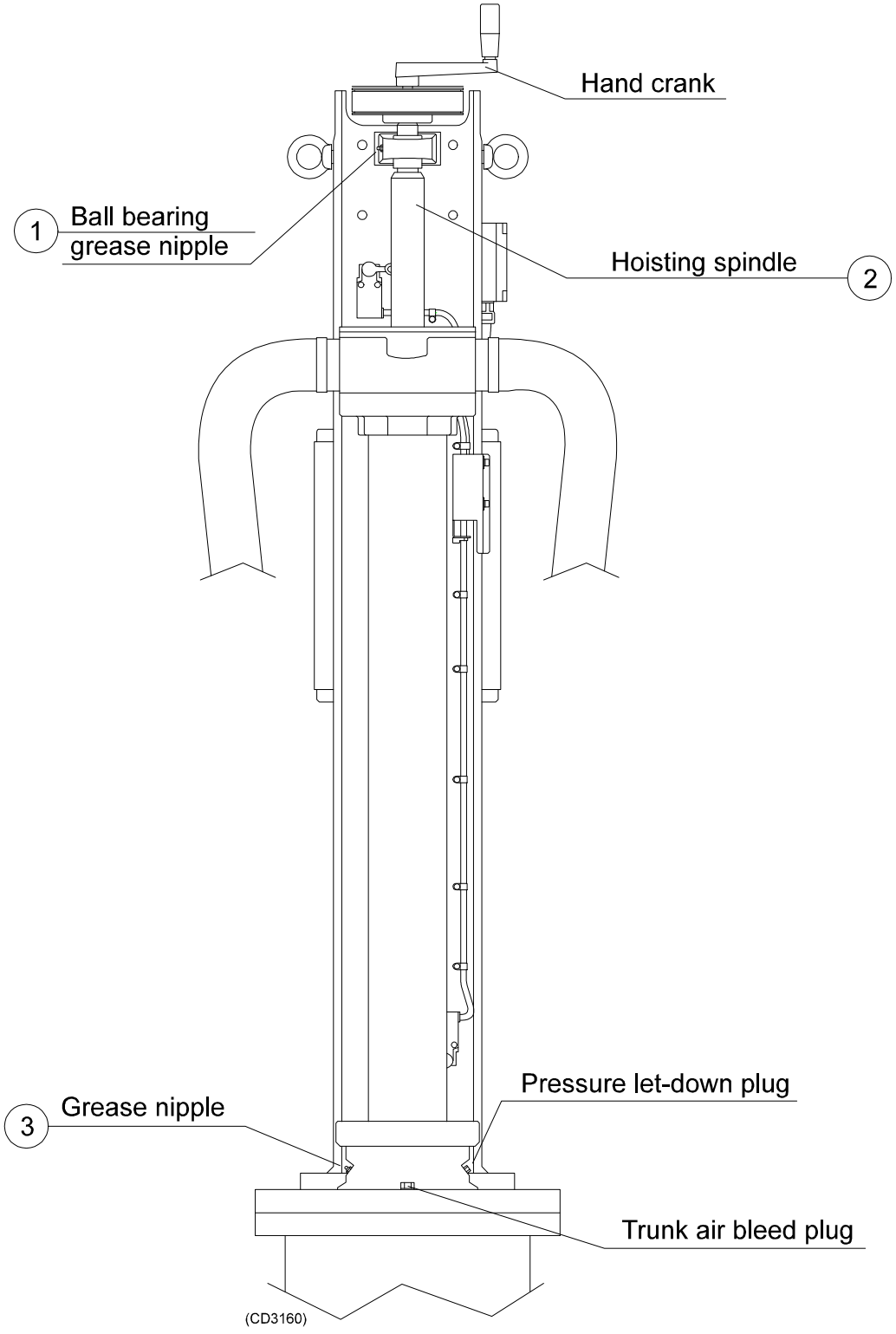

Figure 4 - The Hull Unit

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ISBN 82-8066-017-8

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